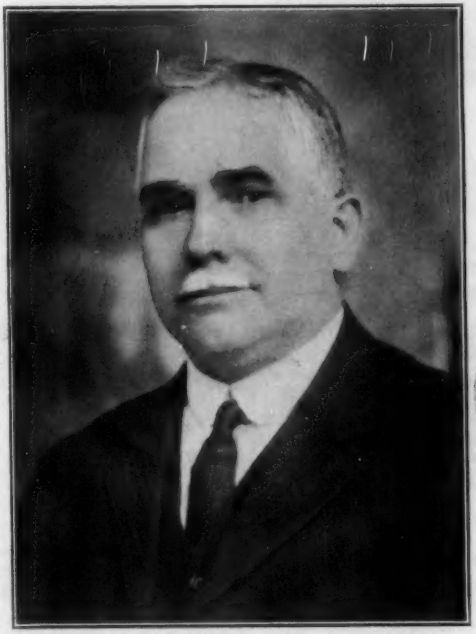
Convention Number *The*

MONTHLY REVIEW



GEORGE GEHLING President

JAN 19 1934

JUNE, 1931

American Electro-Platers Society

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MONTHLY REVIEW

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VOL. XVIII JUNE, 1931 No. 6

PRESIDENT'S LETTER

Before the next issue of the REVIEW is in the members' hands the Rochester convention will be in session, and the convention committee have done all that can be done to make the convention interesting for all those who are fortunate enough to be able to attend.

We are sure most of our members would like to attend a convention some time or other and are hoping that the next convention will be held in or near their city so that they can have the pleasure of enjoying a convention. Los Angeles, Bridgeport and Philadelphia Branches are looking forward to getting the 1932 convention, but why only these three branches? There should be at least six districts or branches interested in wanting the convention, and if the members attended their meetings the branch officers would be pleased to go out and hustle to get the convention in their city; it should be each member's ambition to look forward to taking part in some convention, and if you try hard enough your ambitions will be realized.

The organizing of an Educational Bureau has been a slow and tedious process, but the same has been started, and district chairmen have been appointed and they are trying to get the Bureau in shape for next season's activities. Some members have been under the impression that the only thing the Bureau is to do is to get printed instructions for a class, but all the printed instructions in

the world could not start anything unless the members themselves are interested.

One of the first and important steps for the Education Bureau is getting a list of speakers and subjects for the branches so that their meetings will interest their members and bring them out to the meetings, and this is just what Chairman Hirsch is now trying to accomplish.

The Research Committee has made considerable progress in getting a Research Associate at the Bureau of Standards in Washington, D. C. and getting started on "Standard Platers Deposits" something which we have been looking forward to for a great many years, and we are on a fair road now to getting some results along these lines.

Chairman Hay asks all members to try and take an active part in their branch in seeing that this work is supported so that real results can be obtained by the committee. Chairman Hay will also call a meeting of all the delegates at the Rochester convention to explain his plan of activities, this call will be announced at the convention and each delegate is requested to attend this meeting.

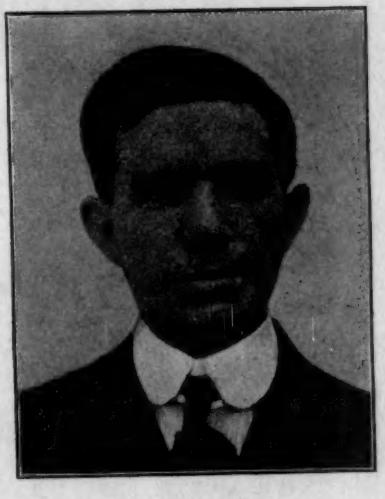
Editor Kennedy has made some remarkable strides in trying to make the MONTHLY REVIEW what the members desire it should be, and he also invites the members to send in any material they believe will help the REVIEW attain the proper standing among our members.

The American Society for testing Materials have extended to our Society an invitation to take out a membership in their Society, believing we will find it desirable, inasmuch as they have thirty-five committees presenting reports each year and also many interesting papers and technical discussions, and as a member we will have the privilege of securing preprints of such reports and papers that we, as a Society, may be interested in.

The Executive Board will submit the above to the Rochester convention for their approval or rejection.

GEO. GEHLING, *President.*

RAMON P. LOPEZ, Rochester
2nd Vice-President



Again Rochester will be host to the American Electro-Platers' Convention, which will be held at the Hotel Seneca, June 29th to July 2nd.

In 1920, Rochester had the pleasure of entertaining the platers at their Eighth Annual Convention, and at that time the membership was 870. Today it is almost double that figure.

It has been wonderful to watch the progress this Society has made, and I believe its future advancement will be even more interesting.

One of our outstanding developments made this past year was the putting into operation the Bureau of Education by our Supreme President. Although this Bureau has been in operation less than a year, it has already proved its value to a great many of our members, and I feel that we are just beginning to realize the tremendous benefits we can all receive through the functions of this Bureau, and it will play a very important part in the educational program of our future conventions.

Let's make the 1931 Convention a success by your attendance. Some very interesting papers have been prepared, and the committee has worked hard in planning a good entertainment program.

I am looking forward to the pleasure of welcoming you in Rochester.

R. P. Lopez,

Second Vice-President.

A. E. S. Nineteenth Annual Convention Program

June 29, 30, July 1, 2, 1931

Men	
MONDAY, JUNE 29th	
Morning:	Registration Business Meetings
Afternoon:	Technical Session
Evening:	Technical Session
TUESDAY, JUNE 30th	
Morning:	Technical Session
Afternoon:	Picnic at Ontario Beach Park
Evening:	Picnic at Ontario Beach Park
WEDNESDAY, JULY 1st	
Morning:	Technical Session
Afternoon:	Plant Visits
Evening:	Banquet
THURSDAY, JULY 2nd	
Morning:	Technical Session
Afternoon:	Business Meetings Extra Plant Visits

Women	
MONDAY, JUNE 29th	
Morning:	Registration
Afternoon:	Fashion Show
Evening:	Open
TUESDAY, JUNE 30th	
Morning:	Open
Afternoon:	Picnic at Ontario Beach Park
Evening:	Picnic at Ontario Beach Park
WEDNESDAY, JULY 1st	
Morning:	Shopping Tour
Afternoon:	Plant Visits
Evening:	Banquet
THURSDAY, JULY 2nd	
Morning:	Open
Afternoon:	Sight-seeing Trip

CONVENTION NEWS

There is a time in everyone's life when he would like to increase his knowledge in certain lines, but to the electroplater this time never ceases because of the advancements being made continually. The plater who does not follow these new developments cannot compete in the manufacturing game today with those who do. There is only one best method of getting this knowledge, and that is by attending the conventions of the American Electro-Platers' Society held annually. The saying is that "The best is none too good," and that goes for the plating industry, because platers are striving to improve the finishes not only for appearance but for durability as well. If the plater cannot do this, he must give up to some other way just as chrome steel threatens to displace chrome plated goods. He thought there was nothing better when chrome plating succeeded nickel, but during the past year this has been proved a folly. The calcium chloride used on city streets certainly did plenty of damage to chrome, especially on bumpers and hub caps. So, you see, there is need for great improvement in durability of finish.

As stated above, there is one way of acquiring this knowledge, and that is by attending the convention of the American Electro-Platers' Society to be held at Hotel Seneca in Rochester, New York, June 29-30, July 1-2, 1931. A tentative program of papers to be read at this convention is as follows:

1. "A Resume of Silver Plating," by Mr. Frank H. Mesle of the Oneida Community, Ltd. Rochester Branch.
2. "A Study of Silver Plating Solution," by Mr. E. Egeberg and N. Promisel of the International Silver Co. American Electro-Chemical Society, Birmingham, Ala., Meeting.
3. "Electroplating on Cold Rolled Steel," by Mr. Geo. B. Hogaboom of the Hanson, VanWinkle Munning Co. Newark Branch.
4. "The Growth of the Use of Artificial Abrasives in the Preparation of Metal Surfaces Before Plating," by Mr. Collins L. Hall of the General Abrasive Co.
5. "Buffing Compositions," by Mr. L. R. Eastman of the Frederic B. Stevens Co., Inc.
6. "Summary of Researches of Electroplating at the Bureau of Standards," by Dr. W. Blum.

7. "The Porosity of Chromium Deposits," by Mr. W. F. Barrows and Mr. A. Brenner of the Bureau of Standards.
8. "Progress Report on Exposure Tests of Plated Coatings," by Mr. P. W. C. Strausser, Research Associate.
9. "Looking Backward and Forward in the Electroplating Industry," by Mr. Chas. H. Proctor (Founder of the Society) of the Roessler & Hasslacher Chem. Co.
10. "Further Developments of Low pH Nickel Plating," by Mr. W. M. Phillips of the General Motors Corp. American Electro-Chemical Society, Birmingham, Ala., Meeting.
11. "The Use of Colorimeter in Industry," by Mr. Theo. J. Zak of the Bausch & Lomb Co. Rochester Branch.
12. "High Speed Nickel Plating as Practiced in England," by Mr. Cannings. This paper was presented at the American Electro-Chemical Convention at Birmingham and will be read by some member of the Rochester Branch.
13. "Tarnishing of Chromium Plating," by Mr. W. M. Phillips of The General Motors Corp. American Electro-Chemical Society, Birmingham, Ala., Meeting.
14. "Chromium Deposits Directly on Aluminum," by Dr. Work and Mr. Slunder of the Aluminum Company of America. American Electro-Chemical Society, Birmingham, Ala., Meeting.
15. "Chromium Plating in the Automotive Industry." "Deposition of Chromium upon Articles made from Sheet Zinc in the Automotive Products Industry," by Mr. Charles H. Proctor of the Roessler & Hasslacher Chem. Co.
16. "Full Automatic Plating Machinery," by Mr. A. H. Hannon of the Frederic B. Stevens Co., Inc. This paper will be illustrated with lantern slides.
17. "From Mine to Consumer," by the American Brass Co. This paper will be illustrated with moving pictures covering mining, smelting and refining of copper, as well as the fabrication of copper and copper alloy materials into all forms of sheet, wire, rods, and tubes.
18. "Barrel Rolling and Plating," by Mr. Ray J. O'Connor, Bridgeport, Conn.
19. "Barrel Plating with Zinc Cadmium Alloy," by Dr. L. W. Staub of the Washington University. St. Louis Branch.
20. "Black Oxidize Finishing," by Mr. J. C. Hudgins and Mr. H. A. Cameron of the Taylor Instrument Co. Rochester Branch.
21. "Anodic Phenomena in Cadmium Plating Baths," by Gustaf Soderberg.
22. "Science and Practice in Electroplating," by S. Fisher, Jr., B.S., M.S., Los Angeles Branch.

You cannot afford to miss such a program as this and still be up to the standard in the plating industry. Note the names of the men

who are doing the real work to improve plating, men who devote most of their time in experimenting and research work. The discussions that follow the reading of these papers is worth the time of any man so interested.

The work of paving the way for this coming convention is being done by a group of men headed by Mr. S. P. Gartland, of the Delco Appliance Company, a past national president of the A. E. S., who as general chairman is capable of doing things in a big way. He is being assisted by the following committees:

REGISTRATION—Mr. J. R. Elster of Folmer Graflex Corp., Chairman; Mr. H. A. Cameron, Mr. A. Doering, Mr. C. R. Wheeler, Mr. H. A. Gulbrandsen.

PROGRAMS AND PRINTING—Mr. Chas. Griffen of Griffen and Yengst Metal Finishing Co., Chairman; Mr. Ed. Crowley, Mr. Chas. Puffer.

TRANSPORTATION—Mr. W. D. Hart of Colonial Radio Corp., Chairman; Mr. F. A. Glitzer, Mr. Chas. Hehr, Mr. E. J. Beaudry, Mr. J. R. Snyder.

PUBLICITY—Mr. F. J. Kohlmeier of Bausch & Lomb Opt. Co., Chairman; Mr. F. P. Kolb, Mr. J. R. Elster, Mr. W. A. Guy, Mr. R. O. Warner.

HOTELS—Mr. R. Lopez of Hickok Mfg Co., Chairman; Mr. S. E. Felton.

PAPERS—Mr. R. Lopez, Chairman; Mr. F. C. Mesle, Mr. Wa. A. Heinrich, Mr. A. E. Pettet, Mr. A. Thurber.

ENTERTAINMENT—Mr. G. A. Lux of General Railway Signal Co., Chairman; Mr. J. J. Desmond, Mr. Wm. Wolfe.

FINANCE—Mr. G. A. Lux, Chairman; Mr. C. A. Reama, Mr. Chas. Griffin.

LADIES AND EXHIBITS—Mr. H. Puffer of Wilmot Castle Co., Chairman; Mr. R. K. Hutchings, Mr. Ed. Crowley.

Mr. C. E. Reama of Hickok Mfg. Co., Ex-Officio.

A complete program will be mailed out in due time giving full details of convention. The papers have been mentioned, but the entertainment will be something of great importance. A convention without some entertainment would get monotonous and tiresome. We have arranged this so everyone will be able to get the most education without getting bored. You can be assured of a good time.

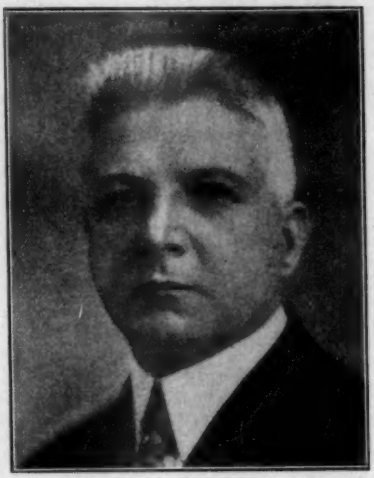
Our hotels are many and have reasonable rates, as you will see on another page of this issue.

The ladies cannot be forgotten. There is an enjoyable program laid out for them. Our only hope is that many will come to partake.

CONVENTION PUBLICITY COMMITTEE

F. J. KOHLMEIER, *Chairman.*

FROM THE FOUNDER OF THE AMERICAN ELECTRO-PLATERS SOCIETY



CHARLES H. PROCTOR

Looking backward through the mist of more than a quarter of a century I glory in the fact that I am the Founder of the American Electro-platers Society. The vision of such a splendid Society as exists occurred years before that time. So as an architect plans in his mind a great, magnificent structure, so the plans lay dormant in my mind until the time became ripe for their fulfillment.

A great building or superstructure is not built with one pair of hands or one mind; it is the splendid co-operation of many minds, and many hands that help to build the perfect structure. After the architect has designed and planned so it is with the American Electro-platers Society, its greatness is due to the untiring efforts of its officials and its membership at large, who through the years past have guided its destiny and made it what it is, and what it stands for today.

No organization or society has ever made a greater imprint upon any industry than the American Electro-platers Society has done, because its votaries have all been master workers for the good of the cause. And so by their untiring efforts will continue through the years of its history in the future. Because there always has been, always will be, willing hands and hearts to do its work and to uplift and educate its members through research and application that will make it still greater in the annals of great industrial societies in the United States.

I shall watch with great eagerness and elation its future growth, as a paternal father watches the development of the child of his creation, and as the years pass by, the Society will be as glorious sunshine to me and will continue so while life lasts.

Its great motto will stand for all time: "Knowledge is Power" and I know it will be carried on through the years of the destiny

of the Society by every one of its members because it has become a part of their very existence.

It is my sincerest wish that the forthcoming Convention at Rochester, N. Y. will be the greatest one ever held by the Society. Rochester is a splendid city, and Rochester Branch should be given every co-operation to make it so by all the members of the Society.

Unfortunately industrial conditions are far from being normal, and no one knows when we shall reach the end of this great depression. What is needed now is some great industrial leaders who like a Washington, Lincoln—or even a Roosevelt, that could lead our country back into the land of happiness, peace and prosperity.

CHARLES H. PROCTOR.

R. J. O'CONNOR
First Vice-President

HORACE H. SMITH
Past President

A. E. S. PROGRESS

H. A. GILBERTSON
Secretary-Treasurer

The twenty-seven branch organizations comprising the membership of the American Electro-platers Society should be grateful, in that they have been able to hold up their membership and meet their obligations to the national society as well as they have under the difficult situations prevailing this last year and a half.

During this period nearly every organization has lost in its membership and has curtailed its activities, but the A. E. S. keeps right on.

The Research and Educational Meeting held at Chicago in January was more productive of real progress to the electroplating industry than any meeting since the inception of the electroplating industry. For two days these committees labored continually to arrange a definite plan of procedure in the testing of plated finishes or coatings and the materials used in their production with the view of standardizing such finishes and materials. They arranged the plan for carrying out these enlarged research programs and the raising of funds to make this possible.

An Educational Bureau was started this year and shows real progress even in the face of many difficulties.

The Employment Bureau made an effort to assist the unemployed members in securing positions. While the results have not been as good as we should like to have them, conditions have had a good deal to do with this, and also the lack of experience of the electroplater to sell himself. He must more definitely define his experience. This is the age of specialization. In our organization we have many different specialists who can properly serve the plating industry. We must learn to fit round plugs in round holes instead of square plugs in round holes. Automobile production platers will not fit in a jewelry plating or coloring factory, nor will a jewelry and silverware plater fit in an automobile factory. We are most valuable to our employers in the lines we have spe-

cialized on. I suggest that more care be taken in filling the Employment Application Blanks so that they will clearly define your most value. This can be done by filling in the class of work that any firm you have been employed by produces and will clearly show where your most valuable experience lies.

It is my desire that this persistent progressiveness will always be the spirit of the A. E. S.

H. A. GILBERTSON, *Secretary-Treasurer.*

OUR SECRETARY-TREASURER

As we come to the close of the fiscal year, we are always interested in the treasurer's report—we are anxious to know how we stand financially, wondering if we have money enough to pay our bills.

How often do we give a thought to the busy man whom we elected treasurer? He it is who handles our finances, carries on the correspondence with the branch secretaries, looks after the more important details connected with the president's office, makes up the quarterly statements, and notifies the editor of the elections, deaths, suspensions, etc., for publication in the REVIEW. These are only a few of the many duties the secretary-treasurer is called upon to perform, and yet after we elect him we soon forget the man and his job.

Mr. Gilbertson has not sought the limelight, but in a quiet, unassuming manner has ably performed the duties of his office. He has proved trustworthy, conscientious and capable, always courteous and willing to cooperate. We are fortunate in having a man who has all these necessary qualifications. The A. E. S. has always been fortunate in this respect.

Our membership appreciates the untiring efforts of Mr. Gilbertson and his predecessors in office, may the Chicago branch of which he is a member of the executive board, and our entire membership have many years of Mr. Gilbertson's unselfish service.

AMERICAN ELECTRO-PLATERS SOCIETY

Statement of Cash Receipts and Disbursements for nine months ending February 18, 1931

Receipts

From branches (see schedule attached) on Balance owing at June 1, 1930	$68.94		
Per Capita Tax			
First quarter	793.30		
Second quarter	707.74		
Third quarter	348.11		
Sale of convention reports	99.52		
Sale of supplies	15.13		
		$2032.74	
On sale of convention reports to members		273.74	
Donation from Baltimore-Washington Branch		150.00	
Of interest on bank accounts		43.92	
On sale of MONTHLY REVIEW		3.60	
			$2504.20

Disbursements

Printing and mailing MONTHLY REVIEW	$1667.34	
Convention reporting, printing of reports, letters, etc.	881.10	
Officers mileage	811.58	
Office Expenses of		
President	78.12	
Editor	37.91	
Secretary-Treasurer	110.10	
Supplies for sale to branches	11.10	
Stationery for Educational Committee	6.86	
Sundry Expenses	15.00	
		3619.53
Excess of disbursements over receipts		$1115.33

Recapitulation

Cash on hand June 1, 1930	$2362.52
Cash Receipts	2504.20
Total	$4866.72
Cash disbursements	3619.53
Cash on hand, February 18, 1931	$1247.19

AMERICAN ELECTRO-PLATERS SOCIETY

Collections on Branch Accounts Receivable
June 1, 1930, to February 28, 1931

	6-1-30 Balance	*1st. Q*	*P.C.T. 2nd Q.*	*3rd Q.*	*Conv. Reports*	*Supplies*
Baltimore		21.00	21.00		3.65	
Boston		15.75	15.75	16.28	3.65	
Bridgeport		33.07	33.60	33.60	3.65	6.00
Chicago		117.08	119.18	119.70	3.76	
Cincinnati						
Cleveland		21.52	20.48	19.95	3.71	
Dayton		18.90	18.90	19.43	3.71	
Detroit		43.58	43.05		3.67	
Grand Rapids		17.33	16.28	16.28	3.67	
Hartford		23.10	23.63		3.65	
Indianapolis		11.55	10.50	9.45	3.67	
Los Angeles		48.30	48.30		7.81	1.50
Milwaukee	33.92	29.92	28.88		3.70	
Montreal		11.02	11.02		3.73	
New York		64.58	66.68	66.68	10.84	
Newark		63.00	66.15		3.63	
Philadelphia		67.73	67.20		3.63	
Pittsburgh		17.33	17.33	17.33	3.67	1.00
Providence	20.32	17.33			3.65	
Rochester		39.38			3.63	
St. Louis		32.55			3.70	
Toronto		33.60	33.60		3.73	
Toledo	14.70	14.70	15.23	15.23	3.71	3.10
Waterbury		16.80	16.80		3.65	
Worcester		14.18	14.18	14.18	3.65	1.00
San Francisco						2.53
Totals	68.94	793.30	707.74	348.11	99.52	15.13

AMERICAN ELECTRO-PLATERS SOCIETY

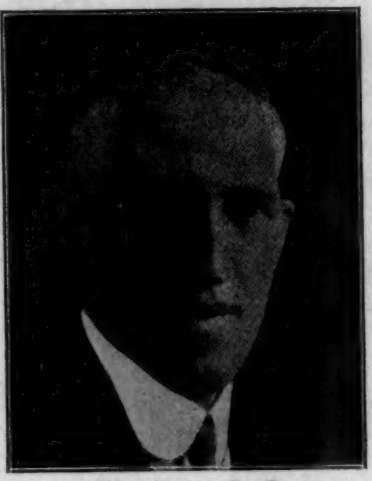
Membership Record, March 1, 1931

	Total Members Nov. 30, 1930	Elections	Reinstatements	Gain by Transfer	Loss by Transfer	Suspensions	Deaths	Resignations	Total Members March 1, 1931
Baltimore-Washington	40								40
Boston	30								30
Bridgeport	64								64
Chicago	228	1							229
Cincinnati	31								31
Cleveland	39						1		38
Dayton	37	1				2			36
Detroit	82							1	81
Grand Rapids	31								31
Hartford-Connecticut Valley	45	2						1	46
Indianapolis	20				2	1			17
Los Angeles	92	4				4			92
Milwaukee	55								55
Montreal	21					4			17
New York	127								127
Newark	126								126
Philadelphia	128						1		127
Pittsburgh	33								33
Providence-Attleboro	33								33
Rochester	78	2					1	1	78
St. Louis	62								62
Toronto	64						1	1	62
Toledo	29								29
Waterbury	32	6						1	37
Worcester	27								27
Totals	1554	16			2	11	4	5	1548

THE RELATION OF THE AMERICAN ELECTRO-PLATERS SOCIETY TO OTHER ORGANIZATIONS

By W. Blum

Bureau of Standards, Washington, D. C.



WM. BLUM, PH.D.

In order to foster "the advancement of the science of electroplating," the Electro-platers Society may well consider not only the status of its members, but also that of the electroplating industry. During the early years of this organization, most attention was very wisely given to the education of the individual plater. Much progress has been made in this direction, though there is still a great need for further advancement, to enable the platers not only to *use* chemistry, but also to *think* chemistry. The continued interest in platers' classes is an evidence that this need is realized and will be met.

Only within recent years has a conscious effort been made by this Society to improve the status of the industry as a whole. The increased use of specifications for plated products has emphasized the present lack of knowledge of the relative value of different coatings for definite purposes. Chromium plating gave an impetus to the industry, which is, however, seriously threatened by the competition of alloys such as the chrome-nickel steels. To meet these needs, the Electro-platers Society has initiated exposure tests of plated coatings, and plans for standards and specifications for plating. The success of such activities will depend upon the extent to which the officers and committees of this Society are willing to co-operate with other organizations, such as the American Society for Testing Materials, the American Electrochemical Society, The Society of Automotive Engineers, The American Standards Association, the Bureau of Standards, and other bodies that have any interest in plating. Such co-operation will not diminish the prestige of the Electro-platers Society, but instead it will improve it, provided the platers are able and willing to contribute definite information and advice on these problems.

In order that the plating industry may be adequately represented in any such activities, some practical progressive platers with a knowledge of chemistry should be appointed on the joint committees, as well as chemists and engineers, who are members of the Society. The latter type of persons will necessarily predominate in the representation of other bodies, but the Electro-platers Society should see that the experiences and views of the platers are fully considered in making plans and recommendations.

While the above named organizations are interested in plating, they have many other activities as well. Hence the initiative and the pressure for the consideration of plating problems should logically come from the Electro-platers Society, which is concerned solely with that subject.

Hearty co-operation of the Society with the other organizations will result in the acquisition of more exact knowledge, which in turn will lead to a more intelligent use of plated metals and to a higher quality of plating. All of these results will improve the status and dignity of the platers as well as of the plating industry.

EDUCATIONAL BUREAU

ALBERT HIRSCH
Chairman Bureau of Education

The Educational Bureau was organized by our Supreme President Geo. Gehling, as a result and wish of the Washington Convention.

This year's work has been one of collecting data and building an organization for the years that are to come.

A circular letter setting forth the purpose of the Bureau, together with a questionnaire as a means of collecting data, was sent to all the branches; only fifteen branches, out of a possible twenty-seven, answered the questionnaire.

After a lapse of several months, President Gehling appointed nine district chairmen and personally visited and interviewed some of these chairmen; these chairmen were fortified with "The Course

of Instructions" as outlined by Dr. A. K. Graham for a Platers Class, and printed in the Philadelphia Branch Year Book.

Quite a number of branches have started classes which have been well conducted during the past winter, and we have been asked by one branch to draft a diploma so they could give the same to their members who went through the course.

The latest work of the Bureau was the sending of a circular letter to many manufacturers to secure and list such speakers as they have, for the coming fall meetings of the branches.

As anticipated, this year's work has been very slow, but, however, a nucleus has been started, and it is the hope of the Bureau to have printed in leaflet form a course of instructions for a Platers Class and ready to send out to the branches on request, and also to have a list of speakers with an itinerary for the branches' use.

AL. HIRSCH, *Chairman.*

ROOM RATES AT SOME OF THE HOTELS IN ROCHESTER

HOTEL SENECA, *A. E. S. Headquarters*

	ROOM RATES	
	1 person per day	*2 persons per day*
Single Room with Bath	$3.50	
Room with Double Bed and Bath		$5.00
Room with Twin-Beds and Bath		6.00

HOTEL POWERS

Single Rooms with Shower Bath	$2.50—3.00—4.00	
Single Rooms with Tub Bath	3.00—4.00	
Double Rooms with Shower Bath		$4.50—5.00—6.00
Double Rooms with Tub Bath		4.50—5.00—6.00
Twin-Bed Rooms on Court		5.00
Twin-Bed Rooms on Outside		6.50—7.00

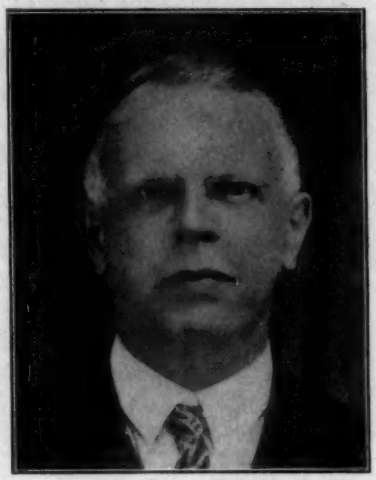
HOTEL ROCHESTER

Single Rooms with Shower Bath	$2.50	
Single Rooms with Tub Bath	3.00—3.50—4.00	
Double Rooms with Shower Bath		$4.00
Double Rooms with Tub Bath		5.00—6.00
Twin-Bed Rooms with Shower Bath		5.00
Twin-Bed Rooms with Tub Bath		6.00

Please make your reservations directly with the Hotel or, if you so desire, through this committee.

HOTEL COMMITTEE,
R. P. LOPEZ, *Chairman,*
72 Wilbur St., Rochester, N. Y.

THE "REVIEW" AND THE SOCIETY



W. J. R. KENNEDY
Editor

Over forty papers dealing with electroplating in its various forms have been written and published in the REVIEW since the annual meeting in Washington last year. Each year the REVIEW seems to be getting more powerful as an aid to our Society. This is as it should be. The papers written are becoming increasingly popular because they help the man on the job.

Last year some of us discussed the REVIEW as though its services were at an end. This pessimistic spirit should never be heard in our midst. The REVIEW's influence can be increased a hundredfold to the betterment of our organization. As long as we have a paper of our own, why not use it to the fullest advantage? Let's bury our old ideas regarding the early years of the REVIEW; it served its purpose well then, but we have not progressed as we should. We have made changes in our meetings, doing things we would not dream of doing a few years ago.

Of necessity we have added to our Society two very important committees, the Research Committee and the Bureau of Education. In Chicago this year, we took a most important step forward in co-operating with other organizations for the purpose of standardizing materials and specifying the amounts of deposit. Why not, then, make this paper of ours more progressive? We may have to make it self-supporting by paid advertising; others are doing it who have little interest in our organization.

We pay over two thousand dollars a year for printing and mailing the REVIEW. Why not use this money for other purposes? At the present time our organization is highly thought of by chemists and manufacturers alike. Our monthly magazine has a splendid opportunity; every public library in the country would be glad to place a copy each month in their files.

Are we big and far-seeing enough to say "GO FORWARD?"

W. J. R. KENNEDY, *Editor.*

Los Angeles Invites You

Dear Members:

At the Rochester Convention the Los Angeles Branch will present an invitation to the American Electro-Platers Society to hold its 1932 convention in Los Angeles, as the Olympic Games will bring people from all parts of the globe, and we, therefore, could, with the approval of the Supreme Body, make this a world-wide Electro-Platers Convention by extending invitations to all foreign countries.

Delegates can come one way and return another, at no extra cost, which will make it possible for them to see and enjoy the attractions of the major portion of the United States. The railroad fare can be made very low, if a train is chartered at some point in the Middle West, also excursion rates will be in force during the Olympic Games period.

Every delegate and member, who would attend the convention, should figure on a two weeks' vacation, and to help the members obtain this, branch Secretaries will be asked to send a list of employers of the members of the Society, who will be asked to allow their Superintendent, Foreman and employees sufficient time to attend this convention, and the employers will also be invited.

We have obtained an option on the Alexandria Hotel, as headquarters, at rates from $4.00 to $6.00, which are considerably lower than regular rates prevailing during this period, which will offset any little extra cost in railroad travel, as these rates are lower than most previous convention rates.

After reaching Los Angeles, the local committee in conjunction with the Los Angeles Chamber of Commerce will arrange for sightseeing trips, which will include Hollywood, Beverly Hills, Homes of Movie Stars, Ocean Beaches, Orange Groves, Huntington Library and many other places of interest, and those who wish may arrange to visit Catalina, Mt. Lowe, or take a jaunt down to Aguascalientes in Old Mexico, also to visit the many charming cities in close proximity to Los Angeles, and all in all, it will be a happy memory for all who attend.

We hope your Branch will give favorable consideration to our invitation by helping us secure its acceptance.

Cordially yours,

LOS ANGELES BRANCH OF THE A. E. S.

M. D. RYNKOFS, *Secretary-Treasurer.*

To the Members and Officers of the A. E. S.

JACOB HAY
Research Chairman

THE time is approaching very fast and we are again getting ready for our great gathering at the Annual Convention of the National Society of the American Electro Platers at Rochester, New York, and it behooves me to inform and remind you that very few of our members have complied with my request and appeal that has been published in the Monthly Review, both in April and May issues. You, no doubt, must realize and know that I as Chairman of your Research Committee can accomplish very little without your assistance and cooperation. In order to gain our point and succeed in raising the funds that are necessary to carry on our Research Work at the Bureau of Standards you must be ready and willing to help.

When you ask your employer to contribute to this Research Fund of ours you should feel that you are not asking for a favor to help us; on the contrary your employer is getting more than value received for his money. By June first our campaign for funds will be started and all manufacturers and other parties interested will be asked to contribute at least one hundred dollars per year so we can carry on our program of research which was formulated at the Research Meeting in January at Chicago in connection with the A. S. T. M. If the membership and the officers of this great society of ours want to carry on the good work that has been done by our predecessors we must all put our shoulders to the wheel and keep the ball a-rolling.

Our society was organized for the Advancement

of the Science of Electroplating and the various branches, therefore, should increase their contributions from fifty dollars per year to at least one hundred dollars per year and take the lead in this work which we must support in order to uphold the prestige of this great society of ours.

I want you to all help for, if you do not help now, you are going to suffer for your laxity in a very short while as you realize we must progress or fall by the wayside.

Jacob Hay,

Research Chairman

THE USE OF BRIGHTENERS IN PLATING SOLUTION

By Joe Hoefer

Crown Rheostat Co., Chicago

Read at Chicago Branch Annual Meeting, January, 1931

Wherever we have an electrolytic process taking place we find many interesting and even fascinating phenomena. Ionization, for example, is most remarkable. If there were no such phenomenon as ionization it would be impossible to transfer the metal particles from the copper anode to the steel radiator shell taking this form of cathode as an example. But when we consider that the size of these copper particles is less than one millionth of an inch, it almost baffles the imagination. And the speed with which these ions discharge and deposit on the cathode is greater than the speed of a projectile being shot from a big siege gun.

To illustrate the minuteness of molecules and ions Dr. Irving Langmuir, in an address given at the time he was awarded the Gibbs Medal for his brilliant work on the Atom, stated, if all the molecules in a glass of water were enlarged to a grain of sand, it would be sufficient to cover the whole United States with sand three feet thick. If we would do the same thing to the molecules of a copper sulphate plating solution, it would cover the country with sand two feet in thickness—still enough to suit the most ardent prohibitionist.

Almost as amazing as the phenomenon of ionization is the almost unbelievable action of brightening agents. It takes only one part of glue to eight million parts of solution to brighten the deposit from an acid copper or lead plating solution.

While discussing the size of molecules and ions let us also consider the size of that glue molecule that exerts such a profound in-

fluence on the character of a metal deposit. This glue molecule is so large that a solution of these molecules diffuse light in much the same manner as a frosted incandescent lamp diffuses light. Such a solution is called a colloidal solution and the glue is known as a colloid. The molecule of a colloid is generally more than one thousand times the size of a crystalloid molecule such as a copper sulphate molecule. Now we can make a most astounding deduction. Assuming that we have one part of glue to eight million parts of solution and one glue molecule is one thousand times the size of a crystalloid molecule, then to brighten an acid copper deposit, it requires only one molecule of glue to eight billion molecules of solution. That such a minute quantity of glue should have any effect whatsoever is remarkable, but when we find that it has such a profound effect, it is still more remarkable. Doesn't such a phenomenon challenge our study? And yet very little is known of the effect of an addition agent on a plating solution which is apparent to anyone studying the literature on the subject.

In searching through the literature I found all sorts of terms being used for "Hypo" Aluminum Sulfate, glue, gelatin, lignin, molasses and cadmium chloride. For the remainder of our discussion, we will call them simply brighteners. In other words, any individual substance which, even when added to a plating bath in small quantities, produces a marked effect upon the character of the deposit, but does not itself take part in the electrolysis, will be known as a brightener. Most brighteners are colloids; some of them are inorganic salts.

We have already found out that in solution a colloid and the ordinary metal particle differ in size—the colloidal particle being in the neighborhood of one thousand times the size of the metal particle. The colloid diffuses light and has a pronounced tendency to produce films and gels. Alexander in his study on Glue and Gelatin states that one molecule of gelatin to 60,000 molecules of water can be made to produce a solid jelly.

In order to get a mental picture of the action of a colloid in the production of a gel, let us use a simple illustration. Suppose we had a number of toy balloons, all sizes and shapes, in a box, and they were not inflated. Obviously we could arrange these balloons as to size and shape in almost any manner we desired. But now, suppose we have some ingenious device whereby we can inflate all these balloons at once. Pretty soon we would have a rigid mass which

would permit no change in arrangement. This is exactly what happens when a gel is formed. The colloidal particles act as the rubber balloon while the water molecules act as the air. Now let us further suppose that this box is made of metal and heat is applied. What happens? The balloons burst. The same thing happens when a gel is heated, only it has the faculty of repairing itself.

If we will visualize this elastic membrane in our plating processes, it will not be so difficult to see the action of a colloid in the improvement of the crystalline structure of a metal deposit. Here again the colloid acts as an elastic membrance which surrounds a number of metal ions and prevents a larger grouping of these ions so that when they are discharged at the cathode the crystals must necessarily be small.

Before discussing the modes in which the final structure of electrolytic deposits, both in the absence and in the presence of brighteners, is produced, it will be necessary to consider the influence of colloids on polarization.

We now have come upon a new term, polarization. What does it mean to us? Lewis and Jackson define polarization as a counter-electromotive force caused either by exhaustion of the substances used in the electrolytical reaction faster than they can be replaced, or by the accumulation of the products of this reaction faster than they can be removed.

Let us analyze this definition. Is this counter-electromotive force something tangible and if so, can it be measured?

We can readily imagine a current passing through an acid copper solution in such a manner that the solution in the neighborhood of the cathode has been exhausted and the solution in the vicinity of the anode is increased to such an extent in metal ions that the anode region is twice as concentrated as the cathode region. Suppose now we remove the source of current and place a measuring device in the circuit. We will find a definite voltage is produced and a slight current will flow in the opposite direction. This counter voltage is the voltage of polarization. In this case it is concentration polarization. There are other forms of polarization which we need not take up in this discussion.

Let us now consider the part polarization plays in actual plating. Suppose we are plating a deep reflector in a silver cyanide bath. Here the concentration of metal ions is very, very low, hence concentration polarization takes place much more readily. The region

around the edge of the reflector where the current density is greatest will be exhausted of metal much more rapidly than the region deep into the bowl of the reflector. The polarization voltage may reach a value of 0.2 volt which opposes the applied voltage of 1.5 volts. Without any polarization present the natural solution resistance plus the decomposition voltage to the near point.

What happens to the polarization voltage when a brightener is added to the bath? In order to give a first hand answer to this question I set to work in the laboratory and prepared a number of experimental plating baths. The results are as follows:

Bath	*Brightener*	*Bath Voltage*	*Current Density*	*Character of Deposit*
Acid Copper	None	0.76	21 amp./sq. ft.	large crystals
Acid Copper	.0001 M Glue	0.82	21 amp./sq. ft.	small crystals
Acid Copper	.0002 M Glue	0.83	21 amp./sq. ft.	small crystals
Hot Nickel	None	2.5	35 amp./sq. ft.	small crystalline
Hot Nickel	.00015 GM Cadmium Chloride	2.8	35 amp./sq. ft.	less crystalline
Cold Nickel	.0001 GM Cadmium Chloride	2.0	10 amp./sq. ft.	smooth fine crystalline
Cold Nickel	.00015 GM Cadmium Chloride	2.2	10 amp./sq. ft.	smooth fine crystalline
Cold Nickel	None	1.9	10 amp./sq. ft.	slightly coarser than above

In the first column we have the type of bath; in the second column the type and quantity of brightener added. The volume of solution in every case was one liter. Attention is particularly called to the fact that all brightener additions were relatively small and in every case there was a decided increase in the bath voltage. Since solution resistance and decomposition resistances remained the same polarization must have increased. The compactness of the deposited metal may be attributed to this increase in potential, which in turn increases the speed of discharge at the electrode surface.

The facts of polarization, although of importance, are not in themselves sufficient to explain the varied influences exerted by colloids. In the final analysis it is the film producing properties of the colloid which controls the crystal formation. The increase in polarization is but a result of the colloidal action. Some may contend that cadmium chloride is not a colloid, but cadmium hydroxide formed in a finely divided state at the cathode is colloidal in charac-

ter. Little is known concerning the action of sodium hyposulphite in a cyanide copper bath.

In fact, very little is known concerning the use of any given substance as a brightener. Who knows that the substances usually used as brighteners are the best? Up until recently there were few who appreciated the fact that throwing power could be increased from 5 to 25% by the use of a suitable colloidal brightener.

At present we have several different brighteners for each of all the known plating solutions, but we do not have several types of plating solutions for a given brightener. There are several plating plants in the city who have changed the type of plating solution to see its reaction with the colloidal agent being used, and they were amazed at the results. I particularly recall where in one plant they are plating cadmium which has the lustre of burnished silver as it is taken from the bath. No burnishing or finishing operations are performed and yet after lacquering the article has a brilliant lustre. I don't think it is folly to predict that some time in the future no buffing will be required on any final metallic coat, providing, of course, the underlying surface is smooth. Before this point is reached, however, someone will have to do some studying, but with the wide practical experience the plater can bring to bear on the problem, it will surely be solved just as surely as he has solved many other problems.

I will feel more than repaid if this little theoretical discussion serves but a little to speed up the pursuit of knowledge in this direction and helps to promote the use of brighteners in plating solutions.

CHAIRMAN SERVIS: Are there any questions?

MR. HAY: I should like to ask Mr. Hoefer what brightener he would recommend for sodium stannate.

MR. HOEFER: Understand I am not an authority on brighteners. I am merely trying to stir up questions on this proposition. I might state that dextrin and dextrose and glucose and many colloids do exert a profound effect on the bath, and produce bright plate.

MR. HAY: Do I understand that the brightener increases the throwing power?

MR. HOEFER: Yes, it does. I might state here that the addition of a brightener will increase the throwing power from 5 to 25 per cent.

MR. HAY: I want to make the statement that in a tin solution these work just the opposite.

MR. HOEFER: Of course, if the brightening agent is too great in quantity you would have the opposite effect. Perhaps your quantity was too great. In some of these cases, as I stated before, the very small quantities will have the maximum effect. If the quantity is too great, naturally you get an amorphous deposit instead of a crystalline deposit. You deposit brightener with your metal, and in that case retard the throwing power.

MR. HAY: Did you have any experience with sodium chloride in the tin bath?

MR. HOEFER: No, I did not.

CHAIRMAN SERVIS: Mr. Hoefer, you mention the use of glue in acid copper solutions. In my experience with glue in acid copper solutions, it has been very detrimental. If they are of use, what amount do you presume could be added per gallon to acid copper solution with beneficial results?

MR. HOEFER: I would rather give you the quantity in hundreds of gallons than in gallons. You can see from this quantity, .0001 of a gram to a liter (I am not quick enough in mathematics), you would probably have to add three or four ounces to one hundred gallons.

CHAIRMAN SERVIS: With the addition of molasses instead of glue, have you found any difference in the results?

MR. HOEFER: Not a great deal, but molasses is required in much greater quantities than the glucose.

CHAIRMAN SERVIS: On the texture of the deposits, what have you found between the two?

MR. HOEFER: My practical experience has been with molasses, and my bigger experience has been with glue. It is pretty hard to draw a comparison to answer that question satisfactorily.

CHAIRMAN SERVIS: While your investigations are very enlightening, I think, on the other hand, we platers have to be very careful in making additions of glue to copper solutions.

MR. HOEFER: Incidentally, you have to be careful in making additions of brightener to any solution, because the quantities are so small, and most platers have not appreciated in the past that small additions are required. I think that with the addition of chromium we began to contemplate that a small quantity of glue or molasses

would have a very decided effect upon the character of the deposit. Too much is pretty bad, because it is hard to remove.

CHAIRMAN SERVIS: Have you found any brightener or any colloid that can be used in the chrome solution beneficially?

MR. HOEFER: That is a rather difficult question. I have run some halfway experiments along that line with the addition of sodium silicate to a chrome solution, but it is pretty hard to make colloids remain as such in a highly acid solution. It disintegrates and acts merely as a crystalloid.

MR. MULLIGAN: For copper, the addition agent, or brightener, you might call it, required is about one-third to one-fifth of what glue does, as an illustration of what low quantity you have to use, for lead deposition. One other thing we must keep in mind is that not all colloids will work. Your vegetable glues will not work in every solution as animal glues.

CHAIRMAN SERVIS: Old hide glue is all right.

MR. MULLIGAN: I am quite sure molasses does not do what is claimed for it; for some glue was left in the solution, and the glue was still doing the work when you got down to the quantity.

MR. N. ZADOWSKI (Cleveland, Ohio): What kind of glue does Mr. Hoefer recommend, any glue from a dead horse or from a dead cat, or from an animal's foot?

MR. HOEFER: Mr. Servis answered that question.

CHAIRMAN SERVIS: Polisher's glue.

MR. GEHLING: Mr. Chairman, we have kind of drifted away from what the speaker started on. I think we ought to stick to the question a little better. The speaker was talking about the different effects brighteners had in a solution, what they did in a solution, and not what brighteners to use, how much, or anything else.

My question is this: Do you find all solutions affected the same as you say with these bubbles blowing up and going about? Do you find the same effect in all kinds of solutions, that the colloids had the same effect in all kinds of solutions?

MR. HOEFER: No, certainly not, because in acid solution it is hard to maintain a colloid. In fact, they do not exist in highly acid solution; at least that is my experience. I may be pulling a faux pas here on that, but that is usually the case. In highly alkaline solutions, such as caustic sodas, your cleaners are practically all colloids, and produce films; and I would say in an alkaline solution a colloid would exist.

THE MAINTENANCE AND LIFE OF CLEANING SOLUTIONS

By R. W. Mitchell

Technical Director, Magnus Chemical Co., Garwood, N. J.

Read at Newark Branch Annual Meeting, April 11, 1931

Important questions generally asked about cleaning materials are:

1. What will it do; or will it do this job satisfactorily?
2. Is it safe and agreeable to work with; safe to the material being cleaned and to the worker?
3. What does it cost?
4. How long will it last?
5. What are the best conditions for its use and upkeep?

The first two questions can be satisfactorily answered by a suitable demonstration. The others are more difficult.

The proper conditions of operation of a cleaning bath, as, material, concentration, temperature, agitation, etc., can be prescribed either from a previously gained knowledge from similar work, or by direct experimentation. The maintenance of such conditions to produce uniformity of operation is not easy however. In spite of a great amount of research and experiment, no one has yet devised a satisfactory method for measuring cleaning power, or degree of cleanliness, or a suitable method for making control tests upon a cleaning solution in the same way a nickel bath may be tested for pH and metal content.

A cleaning solution can lose efficiency in several ways.

1. By neutralization from acid dirt as:
   (a) drag-in from acid solutions (pickles and dips).
   (b) presence of acid material in dirt as:
   drawing compound
   soluble oil
   stearic acid
   soldering flux, etc.
   (c) adsorption of cleaner by dirt which settles out as sludge or floats as oil. (soap is quickly removed by mineral oil).
   (d) drag-out on the work, racks and baskets.
   (e) dilution from open steam pipes, or from overflowing surface oil over overflow dam.
   (f) neutralization by carbonation.

   Factors (a), (b), and (c) will of course vary widely with the nature of the work being cleaned.

   Factor (d) is worth investigating.

Laboratory experiments have yielded the following data:

22 square feet of flat metal withdrew 125 grams metal cleaner solution, or 75 grams soap solution.

Per 100 square feet this is:

$$\frac{100}{22} \times \frac{125}{454} = 1.25 \text{ pounds solution at 4 ounces per gal.}$$

$$\text{This is } \frac{1.25}{8\ 1/3} \times \frac{4}{16} = .038 \text{ pounds metal cleaner per 100 square feet, or .023 pounds soap per 100 square feet.}$$

With hollow or recessed parts the drag-out can be very large.

On cup shaped pieces it amounted to 1.9 lbs. solution per 100 square feet, or .047 pounds cleaner.

On small pieces (particularly if cleaned in a basket) the drag-out may be expected to be larger. This is especially so if the parts are such as screws, nuts, or irregular pieces where solutions can be retained by capillarity.

1575 cu. in. of nuts and bolts had an estimated area of 14,700 square inches. This is 16,100 sq. inches, or 112 sq. feet per cubic foot of work.

1.09 pounds solution was withdrawn per cubic foot, corresponding to .05 pounds of metal cleaner. This means 5 lbs. per 100 cu. ft. of work. This is equivalent to .045 pounds of cleaner per 100 square feet.

It is shown below that one pound of cleaner will clean approximately 200 sq. ft. of metal. It is then apparent that loss from drag-out will range from 4.6% to 9.4% of the total cleaner used.

Loss through the overflow can vary greatly. Suppose in a tank 36 inches deep, the top ½ inch is overflowed daily to remove surface oil or scum.

$$\frac{0.5}{36} \times 100 \text{ gives a daily loss of 1.4\% due to this cause.}$$

In cleaners of high alkalinity loss of strength by carbonation is a factor.

Carbon dioxide occurs in the atmosphere in amounts varying from 3 in 10,000 in the country, to 1 in 100 in poorly ventilated rooms.

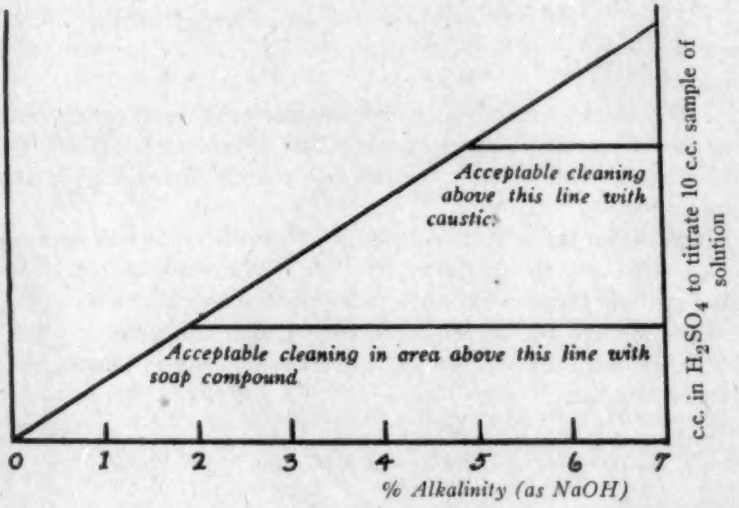
At 1 atm. and 25° water becomes .0338 molal in H_2CO_3 or contains 0.145 gram CO_2 per 100 gm. H_2O.

If air contains approx. 1% we get approx. .00145% CO_2 in the water.

Where heating is done by gas flame the rate of carbonation can be great.

As a rule it is advantageous to work with a solution of low alkalinity. By suitable choice of solution better cleaning can be obtained. And at lower pH, in addition to other advantages, the rate of carbonation is lower.

The following is an actual case. A manufacturer of vitreous enamelled ware was cleaning in caustic soda. He relied without knowing it upon the formation of a small amount of soap in his cleaning solution from action of this concentrated caustic on the grease of the drawing compound going in on the work. His results were irregular and not entirely satisfactory. Daily control of the cleaning tank was run by titration and plotted upon a chart as shown below:



The caustic solution was made up and maintained at 6 ounces per gallon (a high caustic content was necessary to form soap in the solution from the drawing grease). A soap cleaner of low alkalinity was run in competitive test. It gave satisfactory cleaning

at 2 ounces per gallon, giving the same cleaning speed. It ran the same length of time, drag-out being the same in both tanks.

6 oz. caustic per gal. @ 3.6c	=	1.35c per gal.
2 oz. soap cleaner per gal. @ 9⅞c	=	1.23 per gal.
Net cash saving in addition to better working and washing conditions	=	12c per gal.

In general we can say the weekly upkeep should be 10 to 15% of the original charge, or perhaps better, 2 to 3% daily. It is better to add upkeep as small increments daily, rather than in large amounts weekly.

The question of how long the tank will run depends upon too many factors for a definite answer. An answer may be given, however, in terms of square feet cleaned per pound of cleaner.

From Plating Shop Practice

Still Copper Tank $\dfrac{5200 \text{ pieces} \times 7\frac{1}{2} \text{ sq. ft.}}{190 \text{ (metal cl.)}} = 205$ sq. ft. per lb.

Steel Elec. Cl. Reverse Current Rosin $\dfrac{4664 \times 7\frac{1}{2}}{245} = 143$ sq. ft. per lb.

Steel $\dfrac{7140 \times 7\frac{1}{2}}{279} = 192$ sq. ft. per lb.

It is suggested that metal cleaning departments could get some very valuable data by keeping cost records on cleaning, as are shown on the accompanying chart.

It is most certain that such data provides the only certain method of reaching sound conclusions on the relative merits of competitive materials. The value of a cleaner should only be determined by the cost of cleaning 100 square feet of metal and not by its cost per pound.

METAL CLEANING RECORD

TANK CAP. *450 Gal.* *CLEANER XYZ @ 9⅞c*

HEAT *Closed Steam*

OVERFLOW *Dam to Drain* *OPERATOR S.W.S.*

Date	Cleaner Used	Pieces Put Thru	Metal Shape and area	Total Area	Rejects	Sq Ft per Pound	c per 100 Sq Ft	Remarks
			Steel Tire Holders					
1/5/31	110 lbs.	748	7½ sq. ft.		2			
1/6/31	15 lbs.	729	7½ sq. ft.		1			
1/7	15 lbs.	780	7½ sq. ft.		4			
1/8	15 lbs.	784	7½ sq. ft.		0			
1/9	15 lbs.	710	7½ sq. ft.		1			
1/10	15 lbs.	640	7½ sq. ft.		5			
	185	4391		32,900	13	178	5.55	
			Brass Shells					
1/12/31	90	1500	0.39 sq. ft.	586	7			
			Steel Locks					
1/13	10	20,000	.44	8800	16			
			Frames Steel					
1/14	10	901	1.6	1440	1			
			Boxes Steel					
1/15	15	782	9	7040	2			
			Steel Hinges					
1/16	40	35,000	.6	21,000	6			
			Steel Frames					
1/16		200	1.6	320	0			
			Locks					
1/16		400	.44	176	0			
			Racks					
1/17	15	1800	.87	1560	7			
	180			40,912		227	4.35	

PEWTER AND ITS MANUFACTURE

Paper given before the American Electro-Platers' Society, Newark, N. J., April 11, 1931

By B. Egeberg

Metallurgist, International Silver Co., Meriden, Conn.

Pewter is an alloy which during ages has changed its composition to a remarkable degree. So much so that the name Pewter does not any more signify definitely the chemical composition of the metal. It is generally considered to be an alloy of 80% tin and 20% lead, though cheaper grades have contained as much as 50% lead. French Pewter for drinking vessels or food containers of any kind is restricted by law to a maximum of 18% lead to avoid lead poisoning. In England, the Pewter was for centuries controlled by the Worshipfull Guild of Pewterers and fine Pewter consisted of 81% tin and 19% copper, with brass sometimes replacing the copper. Common Pewter had 82% tin and the remainder lead with frequent additions of antimony and bismuth. Recent specifications

of the alloy in England have been supervised by a Government Board. The lead content is restricted to about 10%.

In America, manufacturers of pewter-ware have gone to the limit and excluded the lead entirely which is greatly responsible for the present popularity of pewter-ware. This lead-free pewter has also the advantage of a much better and whiter color which is permanent. It does not turn dark grey as the pewter containing lead.

This lead-free pewter now exclusively used in this country is identical in composition to the so-called Britannia Metal. Britannia Metal is the only pewter alloy dealt with in the following. I want also to limit myself to the making and rolling of the metal into sheets. The following operations, such as shaping the sheets to form by pressing or spinning, I do not intend to touch upon. Further side lines, such as casting to finished shape, soldering and the solders used, I will also omit.

As the name indicates, Britannia Metal is of English origin dating back to about year 1780. It found extensive use in Europe before it reached this country. Due to its better color, its tarnish resisting properties and workability as well as its sanitary properties it is greatly in advance over the leaded pewter. The composition varies within quite a narrow limit: 91% tin, 7½% antimony and 1½% copper is the average composition. The role of the antimony and the copper is but to harden and stiffen the tin.

In the making of the alloy, the widely varying melting point of the constituent metals needs to be taken into account. Tin melts at 450°F, copper at 1975°F and antimony at 1166°F. It is clear that there is a great possibility of overheating the tin in melting. Pewter is therefore made from the so-called hardener which is a pre-melted alloy containing all the copper and antimony and which is readily absorbed by molten tin. The result is not a simple solution of individual metals in one another but of several constituent alloys which have different melting points and which solidify in successive stages, the whole finally being cemented together by the freezing of eutectic. Tin and antimony forms such a constituent appearing as cubes, and tin and copper form another constituent appearing as needles which can be seen, especially the latter, in the eutectic matrix, when examining the cast metal under the microscope.

These three constituents of pewter—besides different chemical

compositions and different melting points—differ also in specific gravity and under certain conditions they might, therefore, settle out, which must be prevented. The best pouring temperature is 650 to 700°F. Before pouring, the alloy should be vigorously stirred. This is mostly done by the use of lump salammoniac or by steam. Saplings can also be used. Before pouring, the metal should be allowed to rest for awhile and the dross skimmed off.

The alloy is cast into permanent molds. These are joined together so as to relieve the casting which now, after the gate is cut off, can be rolled cold into sheets for further manufacture into ornamental and household goods, traveling utensils, etc. The entrance of dross into the casting must be avoided and heating of the molds prevents the ingot from too fast chilling.

The ingots for making sheet metal are mostly in plates about 8x12x1 inch thick and as a rule they are bottom poured. A smooth, clean surface is to be aimed for and cleanliness is one of the main factors during rolling of the *plate* into sheets, so as to prevent foreign materials being rolled into the surface of the metal. This point is more important with pewter, due to the extreme softness of the metal, than when rolling harder materials.

The metal is cold rolled in successive *passes,* no annealing in-between is required. During cold rolling, pewter shows a most interesting phenomenon. Normally, metals become hard when cold worked and finally they will become so hard and so brittle that the metal will crack with further attempt to work it. Therefore, frequent annealing is required in between successive cold working operations before the product reaches its final shape. This annealing restores the grain to its original shape and during this recrystalization, the metal is softened and therefore capable of undergoing renewed cold working. It is naturally understood that the annealing temperature must be correctly chosen for the particular alloy in question.

Pewter responds in an entirely different way to cold deformation. There is very little hardening of the alloy, and that only in the first passes of rolling. This increase is so slight that in practice it is not noticeable. If now the cold working is continued, the alloy becomes softer and the more it is cold worked the softer it becomes. The hardness of a rolled sheet of commercial gage—say .036 inch—is less than half the original hardness of the metal. This softening is therefore material and is noticed by the work-

men at the rolls. The spinner also notices that the blank is harder to work at the beginning than after he has got it well under way. This is mostly laid to the heat he generates in the metal by means of the spinning tool and no doubt this is an attributing factor.

This softening by repeated cold working makes it quite unnecessary for the practical man to resort to annealing. Suppose we anneal it just the same and see what happens. For the better illustration, we will take an ingot and follow it through various cold rolling and annealing operations and take hardness and other physical tests, such as tensile and bend tests at suitable intervals. We will start with an ingot ¾ inch thick and follow it through in a table form.

Thickness	*Scleroscope*		*Brinell*		*Tensile lbs. sq. in.*		*Bend E.L. lbs. sq. in.*	
	Worker	400° F.	Worker	400° F.	Worker	400° F.	Worker	400° F.
¾" cast	10	8	24	24				
½" rolled	12	8	25	23				
¼" rolled	14	10	18	20	7500 El-50%	8700 El-40%	4000	7200
⅛" rolled	15	11	16	19				
1/6" rolled	17	12	13	19				
Commercial size .036			10?	18?			3000	7000

We will roll the ingot from ¾ inch to ½ inch, then to ¼ inch, to ⅛ inch and to 1/16 inch thick and take samples at each stage. 1/16 is about the thinnest which can conveniently be investigated. The scleroscope hardness at the various stages are indicated on the table, both on the cold worked metal and after it had been annealed at 400° F. According to the scleroscope figures, the metal became harder the more it was cold rolled and it is softened by annealing. As you note, this is opposite of which I have just told you, but if you will have patience with me for a moment I will be able to reverse it again. The next column is the Brinell hardness, both of the cold work and of the annealed metal, and here you will note that the metal becomes softer and softer the more it is cold worked and that it becomes harder upon annealing at 400° F. Now the question is, what is *right,* the scleroscope or the Brinell figures. It is generally recognized that the tensile strength of a material follows the hardness figures. The harder the metal, the greater its strength. We will therefore pull a few tensile test specimens of the ¼ inch thick piece in its cold worked condition and

in the annealed condition. If the annealed condition is the strongest, then the Brinell figures must be correct and the scleroscope figures wrong. We found 7500 lbs. per sq. inch on the cold worked specimen and 8700 lbs. for the annealed specimen. The elongation was respectively 50% and 40%. In other words, annealing increases the tensile strength and it also increases the Brinell hardness, which therefore are correct. The scleroscope indicates that a lowering of the tensile strength should have taken place by annealing, and the scleroscope figures are therefore wrong. This shows that the scleroscope should not be used for pewter. If you were to use this instrument on two samples of different hardness, you would make the mistake of reporting the hardest and strongest sample to be the softest and vice versa.

Returning to the tensile test figures, those of you who are sceptical might *argue* like this: We have seen so far that cold working has a great effect upon the hardness and probably also upon the ultimate tensile *strength*. In the tensile machine, the sample stretches and contracts, which is nothing but cold working. This cold work is measured by the amount of elongation the sample suffers. One of the samples showed 50% elongation and has therefore undergone more cold work, and should, according to the Brinell figures, be weaker than the other samples which only suffered 40% elongation. It is, in other words, unproven that the cold worked sample is weaker than the annealed samples.

In order to satisfy the above argument, we took samples of the same material and the elastic limit under bend was determined. Here all cold work was eliminated, and the strength of the material was tested at the load where the very first permanent deformation took place. The figures were 4000 and 7200 lbs. per sq. inch for the cold worked and for the annealed specimens respectively, and I believe this goes definitely to show that a tremendous increase in strength is accomplished by giving cold rolled pewter a heat treatment at moderate temperature.

As you will note, the sample here experimented with was ¼ inch thick. It has received comparatively little cold work and therefore the difference in the Brinell hardness between the work and the annealed specimen is comparatively small. The difference in tensile strength and in elastic limit will be in the same proportion. If it would have been possible to test the commercial size of say .036, its Brinell hardness as worked would probably be about 10

and after annealing about 18, making a difference of 8 points on the Brinell scale against 2 points only for the ¼ inch sample. In the commercial size we therefore would expect a greater benefit in strength by the heat treatment.

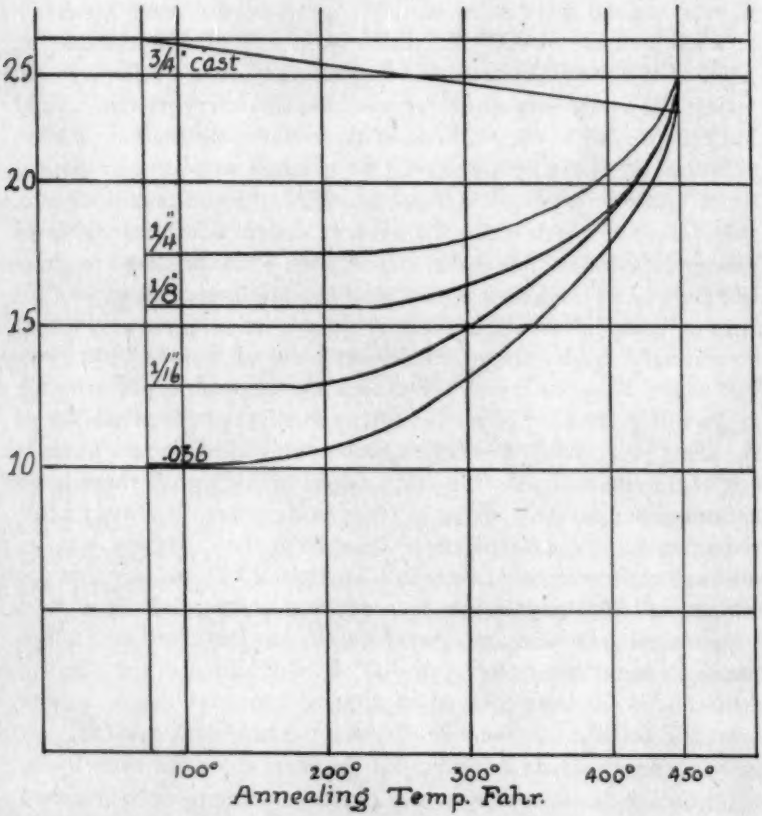
Before leaving the subject of increase in hardness and strength by heat treatment, it should be stated that this is a value to the trade, because one of the main objections towards pewter is the ease with which it goes out of shape. However, it is not convenient to undertake this heat treatment on a finished product. I have given you figures for the increase in hardness and strength after annealing at a temperature of 400° F., which is only 50° below the melting point of the alloy. When at this temperature, when in the oven, an article like a vase or a coffee pot would hardly carry its own weight but collapse due to the *plasticity* of the metal at the mentioned temperature. At lower temperature (for example annealing in boiling water) only a very small increase in stiffness would take place and, therefore, not worth while. This is a treatment which a number of pewter articles, such as coffee and teapots, would undergo in practice anyway. If the increased hardness by annealing at about 400° F. is to be taken advantage of, it is, so to say, necessary that the heat treatment be made on the rolled sheet before it is pressed or spun into shape. Now, the question is, will this press work or the spinning again soften the alloy so as to nullify the effect of the annealing of the sheet? As already mentioned before, and which is also brought out in this table, during the early stages of cold work there is no softening but rather a slight increase in hardness. It is only after reduction in thickness of more than 50% that softness sets in. During the forming of a sheet into an article, I should say that the amount of cold work never exceeds what corresponds to a 50% reduction in gage, and that, therefore, the hardness introduced into the sheet metal by annealing at 400° F. is retained in the finished article. This has been checked on a raised tray, and also on a spun vase, and found to be the case. Besides the benefit of a harder and more sonorous article, annealing of the sheet stock has been found of advantage during manufacture. Trays, for example, can be raised more true to shape, and hammering of the bottom to flatten it is minimized.

Now, it would be nice for those of us who have an inquiring mind to know what is the reason for this abnormal behavior of Britannia metal. Why does it below 50% reduction act more or

less like other metals: hardened by cold working and softened by annealing, only that the effects are so small as to be negligible compared to other metals; and why is it that when cold worked to more than 50% everything is reversed? This is a problem which is not quite solved as yet.

But with this table as basis, we will draw a few curves which at least will give us certain indications as to the reason.

Brinell 70° F. (Room Temp.)



What does this diagram tell us? First of all, it tells us what we already know, that only metal which has been materially cold worked benefits by the heating operation. The more they are worked, the more they are benefited. Second, that the cast or the

cast and annealed condition is the hardest; a condition which cold rolled samples try to regain and in which they are more or less successful, depending all upon the temperature they are exposed to. Increasing this temperature increases also the hardness, and if we were to anneal the samples at 450° F.—which is the melting point of the alloy—the hardness arrived at would naturally be that of the cast metal.

Seen in this light, it is implied that tin under high pressure, as when between the rolls, loses its solving power for some of the other constituents; copper and tin. These are, therefore, precipitated, and when out of solution they do not harden the tin. It would mean about the same as if we took the copper out of sterling silver. The silver would thereby be softened. If now such a cold worked sample is heated, the solving power of tin is increased and the constituents which did precipitate during cold rolling are now brought into solution. This is nothing but what would be expected. Hot water, for example, has a greater solubility for sugar than when the water is cold. The only difference is that in our case we deal with two solid faces instead of one liquid and one solid.

If I, therefore, could prove to you that something is falling out of solution during cold rolling, and that this same amount is again dissolved during subsequent heating, I think you at least must agree that the hypothesis set forth has some basis to stand on. I will try to prove my point by means of microscopic examination.

Slide 1. Shows the *cast* condition, and I ask of you now to keep in mind the amount of white constituents you see.

Slide 2. Is the same after cold rolling to 60% reduction. Note the increase in areas covered by the white constituents.

Slide 3. Is the same as the previous sample after annealing. You note that much of the white constituents has been absorbed; it has disappeared.

Slide 4. Shows the alloy after 95½% cold reduction, which is the amount that commercial gages approximately receive. You will note that the specimen is speckled with small white areas.

Slide 5. Is the same after annealing. You will note that only a few areas are left. The rest have been dissolved.

I am here to say that the above explanation might at least be one of the *contributing* factors for the abnormal behavior of pewter. There no doubt are other *additional* factors, which, however, I will not go into.

I have not much further to say about the manufacture of pewter. Fortunately, pewter is not plated, so I do not need to touch upon that subject, which is liable to cause some controversy. When the pewter articles are raised and *spun* and soldered, and the metal does not call for any special solder treatment in those respects, there remains only the finishing operation. The trade name finishing stands for *certain operations* applied to the surface of the article after it has its final shape and intended to improve lustre and general appearance. Probably due to the general financial condition of the country, the policy of late among pewter manufacturers has been towards cutting of cost to such an extent that the quality of pewterware on the market necessarily would be affected. Seen with the eyes of a silversmith, a great percentage of the pewter on the market today would be termed unfinished, and that relieves me from going into detail on this point. I consider, therefore, my talk has come to an end. For those who still are making a high grade, well finished pewter article, I will again mention the necessity of cleanliness. Dross and dirt worked into the surface is highly objectionable in turning and is difficult to remove by buffing, due to the softness of the alloy. The buff has the tendency only to push the harder foreign material further into the metal.

This talk has become more technical, more metallurgical, than intended; but if there should be any discussion I would be glad to answer questions of more practical nature as far as I am able to.

WATERBURY BRANCH

President Wm. J. Gray presided at the May meeting of Waterbury Branch, which was well attended, visitors being present from Bridgeport, Hartford, and New Haven. Communication from Rochester Branch relative to coming convention was read. Letter from Los Angeles Branch relative to 1932 convention was received. Communication from American Brass Company offering to show their film, "From Mine to Consumer," was gratefully received, and referred to entertainment committee for future presentation. The Secy.-Treas. presented his financial report for the past year. The nominating committee, consisting of Wm. Cavanaugh, Joseph Musicio and Seth Marland brought in the following list of officers: President, Leroy Miller (President Gray declining re-election); Vice-Pres., Andrew Perrin; Secy.-Treas., Wm. F. Guilfoile; Librarian, Wm. Cavanaugh. At the conclusion of the business session a social hour was had, Richard Crane presiding at the piano.

W. F. GUILFOILE, *Secretary.*

BRANCH NEWS

MILWAUKEE BRANCH

The Milwaukee Branch of the A. E. S. held an educational session and smoker on Saturday evening April 18 in Lipps Hall. This affair was one of the most successful affairs ever held by the branch. The guests assembled at 8 o'clock and according to the invitations the educational meeting started promptly at 8.30 o'clock. The meeting was opened by President Marty Nischwitz and after the address of welcome he called on Supreme Secretary, H. A. Gilbertson who talked on the progress and general welfare of the A. E. S., he was followed by Past Editor Frank J. Hanlon who kept the audience in an uproar by his witty talk, Oscar Lewis of the research committee then explained this work as suggested by the research committee meeting held in Chicago on January 17. After the guests were introduced the Librarian, Henry Binder, took charge of the educational program.

The first paper, "My Experiments with Low pH Nickel Solutions," was very interesting and Ray Goodsell, who had prepared and presented this paper, was called on to answer many questions. This paper was prepared in response to Dr. Watts who had asked for information in regard to this work.

The next paper "Castor Oil" by Pat Sheehan brought much applause. Pat gave this paper his individual attention and it certainly took the fancy of all present as was expressed by the applause, Pat struck right from the shoulder and did not use kid gloves.

CASTOR OIL

By P. J. Sheehan

The object of this talk this evening is not to try to tell you how to do a certain job an easier or better way, or what particular formula is the proper one for your particular needs, for nobody knows your problems as well as you do, and whatever aid you might receive from anybody would be at the best only superficial. You are the one who must be able to choose the proper formula, the proper process, to suit your particular conditions, and to do this you must know the laws and principles on which the deposition of metals is based.

There is little doubt but that the average plater is fairly well versed in the mechanics of his job, so little need be said about this. You have your way of doing a job, somebody else has his way, and either is good enough to produce the desired results. The way you go about it is usually governed by quantity; and quality specified. But there is one phase of plating where we must all be alike, no matter if we are good, bad, or indifferent platers; we must be alike fundamentally, for the fundamental laws of plating are not man made, they were merely discovered by man. They existed before

any plating was ever done and will remain as long as plating is done. This may sound like a broad statement, taking in a lot of territory, but it isn't, for the laws which govern the deposition of metals are clearly proven scientic facts, as unfailing as the sunrise, and can't be changed by man to suit his whims or fancies.

Here is another statement that you may call broad. On this one you can disagree with me if you choose. Any man engaged in the deposition of metals who does not understand the laws and principles on which plating is based is not a plater at all; he is merely a "robot," a mechanical man, doing as he is directed, without knowing why. He is like a ship without a rudder, going wherever the current carries him. Mechanical knowledge alone is not enough to make a plater. There is a wealth of information coming to the plater today from very able men who are giving a great deal of their time to the platers' cause. Are you, as practical platers, doing your part to help these men to put plating in a higher plane? Have you prepared yourselves, or are you preparing yourselves, that you may be able to take full advantage of what they are trying to do for you? These men who give their time to you so unselfishly are fundamentally sound, their work is entirely governed by fundamental laws and principles, and if you want to understand and interpret their work correctly you must be the same as they, fundamentally sound.

A few years ago I read an article in the A. E. S. Review which stated that the law of Faraday "was all wet." How far-reaching the influence of that article was I don't know, but I hope it was not very great. The article was well written, sounded plausible, and undoubtedly was convincing to those who were not familiar with the fundamental laws of plating. And still this law of Faraday which that writer challenged is the very foundation of plating. Without it plating would be a guess; the best guesser would be the best plater. Like a house built on sand, every wind would blow away your foundation. I would not say that the author of that article was ignorant; he may have been a whole lot better informed than many of us. He must have tried to improve himself or he would not have known of Faraday's law. So let us be charitable and say he was a good plater, mechanically, but not fundamentally sound.

If we passed out a questionnaire here this evening asking the following questions, what would your answers be?

Do you know, and can you apply the law of Faraday?

Do you know, and can you apply the law of Ohm?

Do you know what polarization is?

Can you determine the proper anode and cathode current densities for certain types of baths which you use, etc., etc.?

We could make our questionnaire a rather lengthy one, but it isn't necessary, just answer these few questions for yourself, how you answer them should tell you if you are doing your share of the work towards elevating the plater to the place where he rightfully belongs. The A. E. S. could be likened unto a chain, it can't be any stronger than its weakest link.

I am not criticising nor ridiculing, I am pleading for a work we all love so well, making a place in the sun for the plater, and if the plafer is ever to have a place in the sun, he will first have to be fundamentally sound.

Now the question arises, what must the plater do to become fundamentally sound? What must he know that he may be able to interpret correctly the laws of plating?

Let us take the law which we have said is the most fundamental of all plating laws, Faraday's law. And see what knowledge is necessary to interpret it. This is the law:

The weight of material dissolved or deposited at either electrode is proportional to the current, the time, and to the chemical equivalent of the substance. That we may be able to see this law a little clearer, let us do what Faraday probably did when he discovered this law.

He probably took three jars containing respectively solutions of nickel sulphate, copper sulphate and silver cyanide, he then connected them in series, weighed his anodes and cathodes carefully, placed them in their respective sol., noted the time, threw in the switch, which allowed the current to pass through the solutions, until he had deposited 107.9 grams of silver, he also found that he had deposited 29.35 grams of nickel and 31.8 grams of copper, he probably repeated this experiment several times always with the same results, he noted the time and current carefully and found that it took exactly 26.8 ampere hours on each experiment to get that exact weight. By looking up his chemistry (if he had one) he saw that the atomic weight of silver was 107.9 the atomic weight of nickel 58.7 and of copper 63.6, he also saw that the valence of silver was 1 of nickel 2 and copper 2. The increase in weight on the

silver cathode was exactly the same as the atomic weight, and the increase in weight on the nickel and copper cathodes was exactly the atomic weight divided by the valence, so this is what Faraday tells us in his law, that you can deposit the atomic weight of a substance divided by its valence in 26.8 ampere hours, if all conditions are 100%.

So regardless of what any author may write or what any expert with high powered salts and formulas may say, the maximum amount of metal that can be deposited from any solution regardless of conditions, hot, cold, tepid, low in metal, high in metal, agitated, still, or what have you, is the atomic weight of that metal, divided by its valence in 26.8 ampere hours.

This is the law which makes plating something more than a trade, you may change your type of racks, you may change your process, change your solutions, but you or no one else can change the law of Faraday, for it is not man-made, it was merely discovered by man.

When you became a member of the A. E. S. a certain amount of authority was vested in you, that is, the authority to advertise yourself as a plater with the sanction and backing of the society, along with this authority went responsibilities, we know you have accepted the authority, but have you accepted the responsibilities, the responsibilities which you owe to your fellow members, and the society in general, the society can't be any better than you are, for when you accept a job and display the society's credentials, you are the standard by which the society is gauged in that particular plant, it can't be any better or worse than you are. So if for no other reason than a sense of justice, you should improve yourself to the limit of your ability and opportunity.

The last paper, "The Education of the Electroplater," by Harold Faint, was what the boys were looking for, and it certainly was well prepared; it was a fitting climax for this interesting program. After reading this paper Mr. Harold Faint was called upon to explain the education classes as are now being conducted.

THE EDUCATION OF THE ELECTROPLATER

By H. W. Faint

U. S. S. Lead Refinery, Inc., East Chicago, Indiana

Paper read at Annual Educational Session, Milwaukee Branch, American Electro-Platers Society, April 18, 1931

At the Washington convention last year, one whole evening was given over to the discussion of education within our society. Out of that meeting has come our Bureau of Education, which has

as its objective, the training of our whole membership in the technical part of our work.

Only three ways are commonly used to increase our knowledge of electroplating. The lectures and papers at our various meetings have been a feature of the A. E. S. throughout its history. Evening classes held in evening schools, to study various chemical reactions, have met with some success. Individual study by the plater with a craving for knowledge, is the third way.

This paper will be a discussion of these means of education in the hope it may lead to the goal that was suggested in Washington, and made famous by a phrase you all recognize, "Milwaukee Dan wants a definite plan."

Now let us be perfectly frank in our discussion of lectures and papers at Branch Meetings. The librarian, or the speakers, or program committee, at present, is constantly watching for a speaker on any topic related to the industry in general and feels relieved when he gets a man to talk on any topic. The topic discussed may be of interest to all or only a few men present. It may be highly instructive to those who heard it and total loss to our brothers too far away to be regular attendants at meetings, but because the talk is not reduced to writing, those who heard, forget, and absent members never know.

In view of these conditions, might it be possible to proceed somewhat in this manner? Each year a branch program committee will meet to decide on the topics of greatest interest to the members at the time. Then the committee will plan to get speakers on various phases of the topic for the meetings that year. For example, we will say the discussion is "hot" on the low pH nickel solutions. The committee might proceed by getting a plater using such a solution, to describe the work, at one meeting. Then a speaker could be obtained, to discuss anodes for low pH solutions. Another could discuss maintenance of the low pH solution, from a chemical standpoint. The cost of the new against the old solution, in terms of finished work, is another topic. Again a discussion of the deposit as to its structure value, as compared with other nickel deposits, would be worth while. The relation of the low pH deposit to undercoatings such as copper, also to overcoatings such as chromium, is of interest. There are suggested six possible topics—all outlined in advance—speakers secured for their particular knowledge of the subject—written papers, or at least outlines of

the papers prepared, for the Monthly Review, and because it's a definite plan, the Branch Meeting attendance is good.

Evening classes in evening high schools, or other available laboratories, are usually confined to courses of analysis of plating solutions. This type of course is now fairly well outlined—so that the subject-matter or text-book of instruction can be obtained from such branches as New York, Newark, Philadephia, or Chicago. The instructor can usually be found within the branch membership. To make the course of the most practical value, the members should be encouraged to secure what little chemical apparatus and supplies are needed, either at their company's expense or their own expense. This laboratory course must be followed by a series of class meetings, using actual cases to show maintenance of solutions by interpretation of chemical analysis. Any active member of our society can prepare a good plating bath, but few can step into a place, analyze existing solutions and correct the solutions to desired figures in a scientific manner. The proper study of the above course should qualify any active member to do so.

The next step in class work is to teach the testing of solutions for impurities detrimental to the plating bath and how such impurities may be removed. Such a course is being prepared for Chicago Branch for next winter's class.

Someone can do a great service by working up a class course in the study of deposits, taking in salt spray tests, paper spot tests, measurement of thickness of deposits, throwing power, microscopic examination of deposits, etc. This course should not be too technical.

And now we come to the plater himself. He has many routine matters to take up his time, but a little study will soon make him able to understand "the reason why" many good and bad pieces appear in the end of the plating department production line.

The plater may take a standard book on the subject as a guide; then determine to understand all he can about his work. To illustrate this, I am going to ask just 20 questions. Do not answer them aloud, but count up the number you are sure you can answer.

1. Figure the area of a nickel anode, oval type, in square inches.
2. What is the capacity, in gallons, of a rectangular tank 5′x3′x4′?
3. Do you know how to change grams per liter to ounces per gallon?

4. Can you figure the area of a radiator shell?
5. What does the specific gravity of a solution mean?
6. Can you figure cost of power in kilowatt hours for a given deposit?
7. What governs the size of bus bars and racks?
8. Describe a simple way to tell which is positive lead from a generator.
9. What effect has series connection on amperage and voltage?
10. What effect has parallel connection on amperage and voltage?
11. How can you detect copper in a nickel bath?
12. Do you add sulphuric acid to water, or water to sulphuric acid? Why?
13. What does pH measure?
14. What is the purpose of boric acid in a nickel bath.
15. How do you reduce the sulphates from 2 to 1 oz. in a chromium bath?
16. What are the purposes of chlorides in a nickel bath?
17. Why is voltage important in a nickel bath?
18. At a current density of 15 amperes per square foot, what weight of acid copper, in ounces, can be deposited per ampere hour?
19. What is meant by current efficiency in a plating bath?
20. Why have agitation of solutions while depositing metal?

You will note that some of the questions refer to calculations, some to electricity, some to chemistry, some to electrochemistry. Ours is a calling which demands knowledge from several fields of science—hence a chemist is not a plater, and a plater is not a chemist. Each can aid the other in the production of a plated article, but finish of which article will reasonably withstand the wear upon it.

In closing, the Bureau of Education of the Society stands ready to help any Branch in a program the Branch desires to undertake. This ready offer of help is based on the ability of each branch to contribute something that will assist the others in the program of education.

After the educational meeting the guests were treated to a feast for which Milwaukee Branch is to be complimented, and which made Milwaukee famous.

After the feast the guests were treated to high class vodvil put on in low class style. Pat Sheehan presided over this affair and many of the

guests were minus vest buttons as a result of listening to this entertainment de luxe. The song of nations, a novel stunt originated by Pat Sheehan, carried us from Sweden to Italy, the comedy for this stunt was well done by Milwaukee Branches comedian Leonard Beck. Len ought to be in vodvil instead of a plating room.

This affair was attended by sixty guests and members, many of the guests were superintendents and plant managers who were interested in our educational work.

We had visitors from Rockford, Chicago, Kenosah, Racine, Madison, Fond du Lac and Kohler.

The party broke up about midnight with plenty of cheers for Milwaukee Branch and praises for the Board of Managers who originated and carried this splendid program for education and a good time.

MILWAUKEE BRANCH,
Board of Managers.

BOSTON BRANCH

Boston branch held an open meeting at the American House, Thursday, May 7, with President Gale in the chair.

It was one of the largest meetings we ever held, about one hundred being present.

The speaker of the evening was Mr. George B. Hogaboom who spoke on Nickel Plating, after which he answered all questions.

A rising vote of thanks was given to Mr. Hogaboom for his very interesting talk.

Three applications were received and referred to the Board of Managers.

Election of officers will take place at the next meeting, June 4.

The chemistry class will close in two weeks and will start again in the fall with an increased membership.

A. W. GANETT, *Secretary.*

HARTFORD-CONNECTICUT VALLEY BRANCH

The Hartford-Connecticut Valley Branch held its regular meeting on Monday evening, April 27, 1931, at the Springfield Chamber of Commerce Rooms, Springfield, Mass.

The meeting was called to order at 8:15 p.m. with President Beloin in the chair, with an attendance of twenty-four members and visitors.

Minutes of the previous meeting were read and approved. All communications were read and placed on file. No bills were presented.

Under new business, it was voted that a sum of five dollars ($5.00) was to be expended for flowers for any deceased member or his wife. At this time we wish to extend to Mr. Roberts, one of our active members, our sympathy for him, in the loss of his wife.

It was also voted to award the members of the platers' class in Springfield, a diploma, suitably engraved and endorsed, at the completion of the work, which will take place in about two weeks. Remarks were made by

Mr. Flowers, the class instructor, who complimented the class on their regular attendance and interest in their work.

A committee of three consisting of Mr. Seidel, Mr. Fleming and Mr. Balick was elected to take charge of the securing of nominations for office for the coming year.

At the conclusion of our regular business, Mr. W. H. Rowe, Electroplating Foreman of the Beardsley & Walcott Co., of Waterbury, Conn., gave a very fine and interesting talk on "Chromium Plating." It was the first talk this year on chromium, and was one of the best the branch has had.

CHROMIUM PLATING

By W. H. Rowe

Beardsley & Walcott Mfg. Co.

Read at Hartford-Connecticut Valley Branch, April 27, 1931

I have been working around chrome solutions for about 6 years, and I do not know of anything new that has been developed in that length of time that has helped us to get better conductivity or to enable us to use less current density in getting a satisfactory deposit. I am a member of both the Electro-Chemist and the Electro-Platers societies, and I absorb all the knowledge that I can gain from both societies, but still I feel that I know very little about the electrodeposition of metals, especially chromium. I have probably been more fortunate than a great many of you fellows in that I have a nice up-to-date, well-equipped laboratory in which to conduct my chemical tests and experimental work. All my plating solutions are analyzed either by myself or under my direct supervision, so that I know at all times just how they stand, and I wish to state right here that the successful electroplater of today must know how to analyze his solutions. I know that in a great many factories you fellows can have no facilities for analytical work, but I believe that in most cases if you can show the manufacturer that you can do the work you will be given a chance. Analysis of plating solutions is not hard to learn and is very interesting. Now I cannot see where there are any secrets in chrome plating, but the solutions require constant supervision, and chemical analysis. One of the biggest problems in chrome deposition is the mechanical ingenuity to get the current where you need it. You need a good, intelligent man on your plating tanks, one who will take an interest in his work and who is not easily discouraged. A good organization on your chrome tanks will save the foreman lots of grief. I have been very fortunate in this respect, and must give my chrome plater credit for working with me.

In chrome plating the actual sulphate content is not so important

as the ratio of CrO_3 to SO_4, which must be kept within the limits of 100 to 1, and 200 to 1. For bright deposits, you must have plenty of power and the correct temperature must be maintained. The first principle of successful chrom plating is in the quality of your nickel plate. You must have a good soft nickel deposit, and to my mind the most important step in nickel deposition is proper cleaning of the work. For nickel, I have never yet seen the chromium deposit itself peel from the work. Whenever you get peeled work the nickel always comes with it and you can usually trace the trouble back to improper cleaning, which might be a greasy film of oxidation or the article might have become more or less passive in the solution before the nickel deposited on it, the nickel solution must be kept fairly clean, we should use pure nickel anodes to prevent the formation of sludge. The chlorine content of the bath should be high enough to give good anode corrosion. Temperature and current density are also factors that govern a good nickel deposit, and I believe it very important to maintain all plating solutions by chemical control. It is very easy to test nickel solutions for the three principal factors, chlorine, acidity, and metal content.

In bright chromium plating I have found that the nickel buffing is just as important as the nickel plating. If the article is not properly colored it will come out of the chrom bath grey and streaked, sometimes you can see every buff wheel mark under the plate. You cannot take a piece of work that has been skinned in the nickel buffing and get a bright chromium plate. It is not necessary to clean nickel plated work for chrom plate, except, of course, where you have perforated articles, or such difficult goods that you cannot keep the dirt out of them in buffing. I get better results in chrom plating just as the work comes from the buff. Most of my work is plated on racks, and we have to use considerable ingenuity in making these racks; there must be a tight contact between the rack and the work, the metal in the rack must be heavy enough to carry the load without heating. We do not want to fill up the plating room with racks, so we must figure on how many different articles we can do on a certain rack. Certain kinds of work require special racks with a frame around them to prevent burning the high spots, and all the rack except the contact points should be insulated to save power. I am getting good results by using Mras & Waldstein red rack enamel. This lasts quite a long time if you keep the racks out of the

cleaner, and when they need doing over it is an easy matter to burn the lacquer off and paint them over.

A great deal of our work is plated on small copper wires, especially bathroom goods. I wire up about 2 to 6 pieces on a wire, then hang the wires on a hanger heavy enough to carry the load. This hanger goes down into the solution so that the wires will not burn off. This applies to the heavier class of work that is difficult to rack. On our lighter work we simply hang the wires right on the cathode bar one after the other while the power is on, at 100 amps. per tank. All our screws, nuts and rivets are plated in baskets with excellent results. This is contrary to what our good friend Dr. Graham states in his article in the last issue of the Metal Industry. (An abstract from an article by Dr. Cuthbertson of London, Eng.) I am plating round head nickel plated brass screws right along for 25c m. It is simply a matter of making your plating basket of the right size mesh, with the right size contact hooks. Of course, in basket plating you have to run the work longer (about 15 minutes) at higher amperage.

In bright chromium plating I am getting the best results from a solution standing 375 gms/1 in CrO_3, and 3.5 g/1 SO_4. Temperature 100 to 110° F. and about 100 amps. per sq. ft. Three to five min. plate is sufficient for our work, and I get a nice bright plate all over. I use 6% antimony lead anodes (no scale will form on these anodes) at a ratio 3 to 1 and a lead lined steel tank with a good exhaust system. Ordinarily the distance between cathode and anodes is about 8", but in plating some irregular shaped pieces we have to move the anodes further away to make the current densities more uniform. For instance, if you were plating a cup-shaped article we will say about 4" deep, the ratio of current density would be about twice as great on the edges as it would be on the bottom. By moving the anodes further away the ratio will become more nearly equal. Of course, this will require more current. In this type of solution you must not have too high a SO_4 content, or you will have to raise the temperature and current density. If sulphate is too low you will not get any deposit except at higher temperature. If sulphate is too high work comes out grey, but you can still produce good work by lowering temperature and raising amperage. Sometimes grey work is caused by loose connections, too high current density, or too much anode surface, that is provided your CrO_3 content is correct. Sometimes you will find when your work does

not plate your temperature may be too low, or you have not enough anode surface, or bath is too high in sulphate.

Too low sulphate content causes a brownish film to appear on work but no plate. It also causes the solution to build up in chromates, but you can still get a deposit by raising temperature 30 or 40% if CrO_3 content is correct. Too high can reduce SO_4 by adding more CrO_3, or if high enough in CrO_3 add water. If sulphate content becomes too high you can reduce it by adding barium carbonate, which reduces the sulphate to barium sulphate. This is not advisable except in emergency, because while barium sulphate is supposed to be insoluble in a chromium solution such is not strictly the case. You will find that your solution will never act as good again; it will be more or less erratic and will gradually build up again in sulphates. I have found that you can reduce high sulphate content by hanging some old anodes on the cathode bar and running the solution cold at a high amperage for an hour or so. My solutions do not get high in sulphate, as I run them under chemical control and am very careful not to add too much sulphate. I find that when I am running the solutions heavy I have to make sulphate additions about once a week. Now perhaps it would be best to put this in a more concise form and state that for best throwing power where you have a large generator and can get a high voltage you would run at high temperature, high current density, low CrO_3 content, and low sulphate content. However, this would take over 6 volts (bright deposits can be obtained more readily at high temperature and current density, but as the resistance is greater a higher voltage is needed).

If sulphate is too low for CrO_3 content, raise temperature. Sulphate too high, you get a grey deposit burnt on edges (lower temperature). Burnt work is caused by too large anode surface, too high SO_4 for CrO_3 content, or too high current. When work does not plate, temperature is too low, or loose connections or not enough anode surface, or too high SO_4 content. Too small an anode surface causes solution to build up in dichromate.

The large amount of trivalent chromium in all chrom plating solutions is due to the reduction of chromic acid during electrolysis. A high concentration of Cr''' causes a corresponding lower concentration of free chromic acid. Brown stains appear on work and resistance is greater. Too low SO_4 content also causes brown film on cathode but no plate (raise temperature).

Large quantities of trivalent chromium in a bath is indicated by the color of solution, the darker the solution the greater the amount present. Trivalent chromium (Cr''') can be converted to the hexavalent chromium (Cr VI) by hanging on the cathode bar a porous pot containing a solution of chromic acid and into which is suspended a strip of lead that is connected to the cathode. The bath is worked at high current density until trivalent content is reduced. No large amount of trivalent chromium can accumulate in a bath if plenty of lead anodes are used. The presence of iron in a chromium solution acts the same Cr''' by increasing the resistance of the solution, therefore requiring increased voltage. Solution high in CrO_3 and proportionately high SO_4 content has better conductivity at a lower temperature and lower voltage (6 volts and under). The easiest way to add SO_4 to bath is to introduce pure H_2SO_4. SO_4 in bath remains constant except for drag out. Throwing power is better on highly polished articles than on dull ones.

When a very low current density is used no chrom will be deposited and the current will reduce the chromic acid to trivalent chromium. A low current density produces a milky deposit, so will too low a temperature. If current density is too high a matted deposit is obtained, therefore you must increase temperature to get a bright deposit. High temperature tends to increase trivalent content. If sulphate and trivalent chrom are high, use a higher current density. When lead anodes are used trivalent chrom formed during electrolysis is reoxidized to a great extent to CrO_3. This is why each morning we charge our tanks for a while at high amperage with a load of scrap on the cathode bar, or a connection on the tank itself, before starting to plate work. Large additions of sulphate to a bath will cause a decrease in the efficiency of the bath.

It is best to remember that at a given current density an increase in temperature reduces throwing power, or at a given temperature an increase in current density improves throwing power, so that it is always advisable to use as high a temperature and current density as conditions in your equipment will permit. After making up a new solution you can always tell when it is ready to give a good deposit. After running it a while you will notice a dirty black scum on top of the solution, next it will have a frothy look, then it will settle down to a steady bubbling action and a ring will form around the cathode and the anodes will take on a clean brown color. It will then do good work. After all has been said, we seem to get the best re-

sults in bright chromium deposition by using the average current density and bath temperature.

Now, brothers and friends, I think I have taken up enough of your time. I don't know whether I have said anything that amounts to much, but perhaps I have said enough to start a discussion, which is always a good thing in the organization. At any rate, in giving this talk I want you to believe that I have done the best I can. I thank you.

Mr. Rowe was given a rising vote of thanks.

The meeting was adjourned at 10:45 p.m.

V. E. GRANT, *Secretary.*

CLEVELAND BRANCH

Cleveland Branch held its monthly meeting Saturday evening, May 2, at Hotel Winton, President E. Steen Thompson presiding.

The minutes of the April meeting were approved as read. Communications were read from Mr. Lopez (The American Brass Co.) and Secretary H. A. Gilbertson.

All the officers with the exception of Librarian were reelected. Mr. G. L. Stroh was elected Librarian, taking the place of Mr. Scott who wished to retire.

Our Delegates to the Convention are Mr. Thompson, Mr. Zadowski, Mr. Stroh. The Alternates are Mr. Singler, Mr. Mullinnix.

The business of the meeting being concluded, the Chair introduced Mr. Jacob Hay, Chairman of the Research Committee. Mr. Hay told of the problems the Committee is working on and asked each plater to do all he can toward soliciting funds to carry on this work.

Mr. Hay then read a paper on "Metal Cleaning." A motion was carried giving Mr. Hay a rising vote of thanks for his splendid paper.

A motion to adjourn was carried at 10:30 p.m.

PAUL STAMM, *Secretary.*

LOS ANGELES BRANCH

The regular monthly meeting of the Los Angeles Branch was held as usual the second Wednesday of the month, April 8, 1931, on the 9th floor of the Chamber of Commerce Building.

The meeting was called to order at 7 p.m. with E. W. Francis presiding. Minutes of the previous meeting were read and approved. Communications were read and duly recorded. Banquet committee gave a full report of the yearly affair held in the Chamber of Commerce Banquet Hall.

One new member was elected and three applications read and ordered filed.

The Los Angeles Branch went on a record at this meeting to extend an invitation to the American Electro-Platers Society to hold their 1932 Convention in Los Angeles.

A committee of four, C. E. Thornton, F. C. Rushton, M. McNulty, and M. D. Rynkofs, was appointed with instructions to proceed with the plans.

Robert Gripp, Librarian, conducted the question box forum and found the following questions:

Question—Is an iron tank without a lining good for a Brass Solution?

Answer—Yes.

Question—Does stirring a nickel solution change the analysis?

Answer—No.

Question—What is the cause of roughness on Nickel deposit and what is the remedy? My anodes are clean.

Answer—Suggestion of an analysis and filter solution if advisable.

Question—What benefit is there in stirring a nickel solution?

Answer—It balances the solution.

Question—Do Nickel anodes need cleaning when a black coating forms on them? What does the black coating consist of?

Answer—No. Carbon and granular nickel.

Question—What must be added to the following silver solution in order that it will plate properly? The analysis report is as follows: 3.19 oz. sodium cyanide, 3.26 oz. silver and 1.28 sodium carbonate. The original formula was 5 oz. sodium cyanide, 3½ oz. silver to the gallon.

Answer—Add 2 oz. sodium cyanide to the gallon. Look for trouble in previous dips.

Question—What is a good formula for a mercury dip?

Answer—1 oz. of bichloride of mercury, 5 oz. of sodium cyanide, 1 oz. of salammoniac.

As a climax to the meeting Mr. Gripp presented A. A. Bissiri, our Chemistry instructor, who gave us a most complete talk on "The Significance of the Nickel pH Determination." Mr. Bissiri also illustrated how a certain amount of acid added to a nickel solution affects each corresponding pH number.

The meeting adjourned at 10.30.

M. D. Rynkofs, *Secretary-Treasurer.*

BRIDGEPORT BRANCH

At the meeting on April 17 all the officers were present. Minutes of the last meeting were accepted as read.

The Banquet Committee reported that at the next regular meeting it would be ready to give a detailed account of expenses and receipts.

The Program Committee reported a net profit on the program of $273.11. Expenses were $184.89 and receipts should be $458.00.

The Chemistry Class Committee reported that there are twenty-eight members in the class with almost perfect attendance. The members are to be congratulated on the interest shown in this class.

It was voted to pay outstanding bills against Chemistry Class, due Yale University.

The Sick Committee reported that Bernie Moran was still on the sick list but would soon be up and around. Bernie has been missed at the meetings as he was regular in his attendance.

It was voted to accept the communications as read.

Mr. Ray O'Connor was appointed to the Prize Award Committee on Papers and Gold Medal to be awarded at the Rochester Convention.

He was also appointed as a representative of the Bridgeport Branch on the Educational Committee, to confer with Mr. Candee of the Waterbury Branch, regarding speakers, and such other educational information as may be of interest to the National Society, as well as to the local branches.

On Friday, May 1, the annual elections are to be held at the Chamber of Commerce Rooms, Stratfield Hotel, Bridgeport, Conn.

Meeting adjourned at 9:30 p.m.

T. H. CHAMBERLAIN, *Secretary-Treasurer.*

ANDERSON BRANCH

A rip-roaring crowd of 75 members and friends of the Anderson Branch celebrated its official installation at the First Annual Banquet which was held May 9th at the Hotel Stilwell in Anderson starting at 6:30 p.m. A group of nationally famous speakers, an excellent meal and program, and a general spirit of jollification, all combined to make the party an outstanding success. By vote of the Branch, women were not included.

With President C. D. Cleaver acting as Toastmaster, the guests from Dayton, Ohio, Indianapolis, Chicago, Boston, Muncie, and other cities, were welcomed in an address by F. L. Burke, factory manager of Guide Lamp Corporation and a member of the local branch.

In the first address on the educational program, Mr. Jack Lawler, vice-president of the Allied Industrial Products Co., of Chicago, spoke on "Metal Cleaning," stressing the essential duties of a cleaner, and the substances generally used.

Mr. Walter Fraine, of the National Cash Register Co., of Dayton, Ohio, spoke on "The Qualification of a Foreman." Mr. Fraine dwelt at length upon the qualities of leadership, ability to teach, and personality.

Mr. Ed. Muller, vice-president of the Becker Varnish Co., of Cincinnati, spoke briefly on "The Effect of Alkali spots on Enameled Finishes," and following this, Judge Woostey, a member of the governing board of the city of Cincinnati, gave a very clever and highly entertaining talk entitled "God Am the Judge."

The members then moved into the next room, where Mr. George B. Hogaboom, internationally famous authority on Electroplating, gave a lecture, illustrated with lantern slides, on "The Effect of Annealing on the Corrosion of Anodes in Brass Plating Solutions." Mr. Hogaboom showed many charts, explaining the extensive research which he had conducted on this subject.

A sleight-of-hand and ventriloquy performance by a local entertainer concluded the organized program of the evening, and all of the fun that ensued was classed as "Unofficial."

MINUTES OF ANDERSON BRANCH A. E. S. MEETING, APRIL 18, 1931

Meeting called to order at 8:00 p.m., with 16 members present. Mr. Phelps, vice-president, was absent. Minutes of the previous meeting were approved as read.

Communications from Mr. Gilbertson, and from the American Brass Co., were read, and a discussion of the film offered by that company followed. It was decided to get this film for the second meeting in May.

An application for membership by E. A. Rhodes was read and referred to a committee.

Mr. Hammond announced that the date for the Annual banquet had been changed to May 9.

Mr. Onksen reported that two speakers had already been secured.

The secretary was instructed to write Mr. Gilbertson for forms certifying delegates to the National Convention.

Dr. Cotton then gave a lecture on Normal Solutions, notes of which were distributed to members.

Question Box

Question—In adding hydrogen peroxide to a nickel solution, what action takes place?

Answer—Nascent oxygen is liberated which combines with the hydrogen on the surface of the metal which causes pits. This highly active oxygen may also oxidize impurities—organic and otherwise—in the bath.

Question—What cleaning process, excluding gasoline wash, would clean brass parts after polishing with tripoli?

Answer—A spray of hot oil has been found effective for this purpose.

Minutes of Anderson Branch A. E. S. Meeting, May 4, 1931

Meeting was called to order at 8:00 p.m., with 24 members and guests present. Messrs. Phelps and Onksen were the only officers absent.

Minutes of the previous meeting were approved as read.

A bill of $1.00 for postcards was approved and ordered paid.

Three communications were read to the branch.

Election of delegates to the Rochester Convention was held, with the following results: *Delegates*—C. D. Cleaver, R. M. Wagner, W. E. Sanders. *Alternates*—E. A. Kaegi, G. W. Onksen, A. W. Phelps.

Mr. Cleaver announced that the annual election of officers would be held at the next regular meeting, May 18.

Mr. Hammond reported progress for the Banquet Committee.

Mr. Cleaver announced that the City Library had, upon his request, purchased copies of "Principles of Electro-Plating and Electroforming" (second edition) by Blum and Hogaboom, and "Plating with Copper, Nickel, and Chromium," by Freeman-Hoppe.

The secretary announced that a donation to the Branch library in the form of a copy of Blum and Hogaboom had been received from the Hanson-Munning Co., through Mr. Cheney.

Mr. Cleaver announced tentative plans for programs throughout the summer months.

Applications were received from Messrs. Whipple, Loree, Butler, and Seabury.

The meeting adjourned at 9:45 p.m.

R. M. Wagner, *Secretary-Treasurer.*

GRAND RAPIDS BRANCH

Regular meeting of the Grand Rapids Branch A. E. S. was held May 9 at the Office of the Kalamazoo Plating Co., Kalamazoo, Mich. Election of Officers was held and the following men were elected: President Lawrence J. Nook, Vice-Pres. Joseph Ver Plank, Secy.-Treas. J. Van Dyke, Board of Trustees R. J. McMeeken, John Raven, John Dykman; Librarian Wm. Earl Stadel.

A very interesting discussion on Chrome Plating took place. The result of which was agreed upon by all present that a good many manufacturers due to keen competition or otherwise are giving the plating industry a bad break by turning out inferior plating by not putting on enough plate to last to exceed six months and in some cases less than that. We could not suggest any remedy because we cannot tell these manufacturers how to turn out their product, but it would be well for them and the plating industry in general to improve on their product. After which Mr. Nook, Supt. of the Kalamazoo Plating Co., served an excellent luncheon and everybody returned home joyously.

At our June meeting we expect to have a two-reel movie of the American Brass Co. showing the making of their product from the raw to the finished article. We urge all members to be present.

J. VAN DYKE, *Secretary.*

PROVIDENCE-ATTLEBORO BRANCH

The meeting on April 17 was held at the home of President Chace, 11 Friendly Road, Auburn.

There was a round-table talk on "Bronze Finish" and Mr. Chace had a number of samples of bronze finish on copper-plated bronze, showing several different shades and explaining how a little difference in treatment would affect the finish.

The basic operation was to give a flash in a cyanide copper and then a heavy deposit in the acid copper bath, then immerse in the bronzing dip—brush, and immerse again if necessary; afterwards wax and lacquer. The formula for the bronze solution was: C. P. Copper Sulphate, 2 oz, Potassium Chlorate, 2 oz; Water, 1 gal. Use hot.

It was brought out that there are many ways of securing a bronze color; another formula was a solution of: Antimony, Sulphide and Caustic Potash.

May 7, accepting an invitation from Boston Branch, 6 members of our branch attended the meeting in American House, Boston, and enjoyed Geo. Hogaboom's talk on nickel plating. "Geo." surely was feeling good this time as indicated by his ability to stay with his subject. There were about 50 present and all seemed to be deeply interested in the talk as evidenced by the numerous questions.

May 15, meeting at 44 Washington St., Dr. Strachen gave us a fine chalk-talk on "Electro Deposition of Tungsten." First he gave a brief outline of the chemistry of the group of which Tungsten is a member; then he described the formula that has been found to give a bright metallic plate. Formula is as follows: Dissolve as much Tungstic oxide as a saturated solution of

Soda ash will take up, use platinum anode, current density up to 200 amp. sq. ft. 5 or 6 volts. Temp. 212 F.

Dr. Strachen was given a vote of thanks for his talk.

JOHN ANDREWS, *Secretary.*

DETROIT BRANCH

Detroit Branch held its regular monthly meeting Friday evening, May 1, at the Statler Hotel. President Joseph H. Hansjosten presiding. After the regular order of business the nomination and election of officers for the ensuing year took place.

The following members were unanimously elected to succeed themselves:

President Jos. H. Hansjosten, 14016 Rochedale Ave.
Vice-President T. C. Eickstaedt, 59 Seward Ave.
Secretary-Treasurer Chas. M. Phillips, 18933 Hickory Ave.
Librarian B. F. Lewis, 10398 American Ave.

Board of Managers

Percy Stapleton, 2621 Fort St. W.
George Kutzen, 1087 W. State Fair.
Chas. Beabian, 1219 Dime Bank Bldg.

Delegates to Rochester Convention

	Alternates
Jos. H. Hansjosten	Chas. Phillips
T. C. Eickstaedt	E. T. Hartz
Percy Stapleton	Chas. Marker

Due to large number of members who will be on their vacation it was unanimously decided not to have any meetings during July and August. Meeting closed with customary question and answer box conducted by Librarian B. F. Lewis.

CHAS. M. PHILLIPS, *Secretary.*

CHICAGO BRANCH

The regular monthly meeting of Chicago Branch A. E. S. was held Saturday, May 9, 1931, at the Atlantic Hotel.

Meeting was called to order with President S. J. C. Trapp presiding, Vice President J. J. Witte was absent, all other officers present.

Our annual election of officers took place and the following officers were elected unanimously: J. C. Kretschmer, President; Thos. Kennedy, Vice-President; E. G. Stenberg, Secretary-Treasurer; O. E. Servis, Librarian.

The Board of Managers consisting of Fred Herbst, Chairman, C. S. Tompkins and Gus Jelinek, were elected by ballot.

Delegates to the convention are Jacob Hay, S. J. C. Trapp and H. A. Gilbertson.

Mr. H. Faint gave a talk on new developments in plating iron pipe with lead. This took the place of the regular lecture and proved very interesting.

The members who miss these early talks and lectures are really missing something worth while.

The regular business having been transacted, the meeting was turned over to the librarian, Mr. O. E. Servis, and the following questions were found in the box:

Question—Will nickel from a sol. containing Hydrofluoric acid tarnish quicker than from an ordinary sol.?

Answer—No.

Question—What process is non-tarnishable silver, and is it controlled by patents?

Answer—Pallidum over silver, and it is a patented process.

Question—What is the best material to use for an air agitator in a chromium plating bath?

Answer—Antimony lead pipe. Wrought iron pipe.

Question—What causes nickel to lift from thin plate of cyanide copper mostly small areas of pencil point size?

Answer—Temperature and cyanide too high.

Question—Would adding Sodium Sulphate to a single nickel sol., where steel and brass are plated help the deposit any? If so in what amount should the sodium sulphate be added? This work must be chrome plated after the nickel.

Answer—No advantage. Interfere with salt spray.

Question—What is a good formula for nickel plating metal containing 95% zinc. If air agitator is used, is a moving cathode necessary?

Answer—Two formulas were suggested:

No. 1	*No. 2*
8 oz. double nickel salts	10 oz. single nickel salts
4 oz. single nickel salts	3 oz. sodium chloride
2 oz. sodium chloride	2 oz. boric acid
2 oz. boric acid	24 oz. sodium sulphate
3 oz. epsom salts	

Moving cathode was thought to be better than the air agitator.

Question—Wanted a good cleaner or a method for cleaning nickel before chrome plating.

Answer—The prepared cleaners should clean the work without trouble. It was suggested, however, that two cleaners be used, one strong caustic and the other mild with a hot water rinse in between.

J. C. KRETSCHMER, *Secretary.*

PLANS FOR ROCHESTER

The International Fellowship Club has ambitious plans for its meeting in Rochester at the time of the annual A. E. S. convention. In addition to the regular meeting, which will, of course, be held, the Club has decided to do something worth while for the convention as a whole and to give all those who attend something to remember them by. They will hold an "Open House" on Monday, June 29th, and give a dance with refreshments to every person who attends the convention, including all members of the American Electro-Platers Society, their friends and guests, both ladies and gentlemen.

The Club wants everyone to attend. A six-piece orchestra will be provided and the refreshments will be more than ample. Everyone may be sure that the entertainment provided will be the best obtainable.

APPLICATIONS

	Branch
E. A. Rhodes, Anderson, Indiana	Anderson
R. L. Seabury, Anderson, Indiana	Anderson
F. W. Whipple, Muncie, Indiana	Anderson
E. L. Butler, Muncie, Indiana	Anderson
M. R. Loree, Muncie, Indiana	Anderson
Albert P. Beckett, 191 State St., Framingham, Mass.	Boston
L. Kessin, 61 Allen Street, Boston, Mass.	Boston
I. H. Ober, 256 Dana Ave., Hyde Park, Mass.	Boston
A. O. Jaekle, 23 Holbrook St., Ansonia, Conn.	Bridgeport
Laurea A. Theriault, 194 East Ave., East Norwalk, Conn.	Bridgeport
Chas. Costello, 1435 Chapel St., New Haven, Conn. (Assoc.)	Bridgeport
John L. Kremer, 1510 N. Lotus Ave., Chicago, Illinois	Chicago
Henry Hagen, 1131 S. Clifton Park Ave., Chicago, Ill.	Chicago
Michael Kinery, 2845 Madison St., Chicago, Illinois	Chicago
W. S. Hathorne, 1031 Pacific Ave., Waukegan, Ill. (Assoc.)	Chicago
L. A. Kampleman, 633 Deming Place, Chicago, Ill. (Assoc.)	Chicago
Chas. H. Craig, 10722 Wentworth Ave. (Active)	Chicago
George A. Kain, Jr., 1911 Fulton St. (Active)	Chicago
R. B. Finnie, 10186 Franers Ave., Detroit, Michigan	Detroit
T. Ferguson, 1321 E. Grand Blvd., Detroit, Michigan	Detroit
Edw. Degrenier, Bronson, Michigan	Grand Rapids
F. H. Twist, 1224 McReynolds Ave., N. W. Grand Rapids (Assoc.)	Grand Rapids
James L. Dye, 145 W. 93rd St., Los Angeles, Cal.	Los Angeles
F. H. Slater, 1918½ N. Western Ave., Los Angeles, Cal.	Los Angeles
A. V. Smith, 1313 Chester Ave., Bakersfield, Cal.	Los Angeles
S. Pinto, 1813 May St., Los Angeles, Cal.	Los Angeles
H. C. Simmons, 219 Pryor St., S. W. Atlanta, Ga.	Philadelphia
A. F. Ewing, 77 Woodward Rd., Providence, R. I.	Providence-Att.
J. E. Nichols, Chace Plating Co., Taunton, Mass.	Providence-Att.
H. K. Lippacher, 12 Prairie Ave., Providence, R. I.	Providence-Att.
V. D. Nash, 167 Lawlor Ave., Toronto, Canada	Toronto
S. L. Henn, Apothecaries Hall Company, Waterbury, Conn. (Assoc.)	Waterbury
R. H. Lee, 1063 Gerard Ave., AP. & C. New York, N. Y. (Assoc.)	Waterbury
L. E. Lougee, 164 W. Main St., Waterbury, Conn. (Assoc.)	Waterbury

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A. P. Beckett, 191 State Street, Framingham, Mass.	Boston

L. KESSIN, 61 Allen St., Boston, Mass.....Boston
L. H. OBER, 256 Dana Ave., Hyde Park, Mass.....Boston
A. O. JAEKLE, 23 Holbrook St., Ansonia, Conn.....Bridgeport
L. A. THERIAULT, 194 East Avenue, East Norwalk, Conn.....Bridgeport
C. COSTELLO, 1435 Chapel St., New Haven, Conn. (Assoc.).....Bridgeport
J. L. KREMER, 1510 N. Lotus Ave., Chicago, Ill.....Chicago
H. HAGEN, 1131 St. Clifton Park Ave., Chicago, Ill.....Chicago
M. KINERY, 2845 Madison Street, Chicago, Ill.....Chicago
W. S. HATHORNE, 1031 Pacific Ave., Waukegan, Ill. (Assoc.).....Chicago
L. A. KAMPLEMAN, 633 Deming Place, Chicago, Ill. (Assoc).....Chicago
R. B. FINNIE, 10186 Franers Ave., Detroit, Mich.....Detroit
T. FERGUSON, 1321 E. Grand Blvd., Detroit, Mich.....Detroit
E. DEGRENIER, Bronson, Michigan.....Grand Rapids
F. H. TWIST, 1224 McReynolds Ave., N. W., Grand Rapids.....Grand Rapids
S. PINTO, 1813 May Street, Los Angeles, Cal.....Los Angeles
H. C. SIMMONS, 219 Pryor St., S. W., Atlanta, Ga.....Philadelphia
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S. L. HENN, Apothecaries Hall Co., Waterbury, Conn.....Waterbury
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M. KUTZ, 709 6th Avenue, New York, N. Y.....Philadelphia

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